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THE B-70 QUESTION — AN EXAMPLE OF THE DECISION MAKING PROCESS IN GOVERNMENT

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THE B-70 QUESTION - AN EXAMPLE OF THE DECISION MAKING PROCESS IN GOVERNMENT

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CHAPTER I

INTRODUCTION

Recent years have brought a relatively new term to currency in academic and political discussion. This term, "National Security Policy," is a somewhat generalized heading for all of those activities which have as their objective the maintenance and furtherance of the Nation's safety. The increasing currency is a result of an increase in the number of factors in the world environment inimical to that safety. The ascendancy of the term over older designations such as grand strategy, national strategy, or national defense is most probably the result of recognition of the fact that none of these previously popular terms adequately encompasses the increasingly broad scope of activities and circumstances now regarded as contributory to that objective. As the world environment changes and becomes more complex it seems ever less possible to isolate any single factor of national activity which does not in some way contribute to the security of the Nation. National Security Policy has as its basic objective the survival of the Nation. A broader statement of objective would expand to include survival in an environment congenial to the ideals and aspirations of the Nation.

1. PURPOSE

<u>Purpose of the Study</u>

This study has been undertaken with the basic aim of contributing in some way to an understanding of the problems of developing and

implementing National Security Policy. The complex nature of the problems and the breadth of the field preclude a comprehensive study being undertaken of all of the aspects of such policy. The necessity arises for isolating and examining a specific aspect of National Security Policy. The aspect selected for examination has been the decision making process as demonstrated in the field of weapons selection.

In one respect such a selection of area might be considered as actually reflecting two fields. The problem of decision-making has begun to develop a literature in its own right, reflective of increasing academic attention to this very basic element of human activity. Since decision-making is a basic human activity it has received attention from several of the academic disciplines, and cannot be classified as exclusively within the province of any specific one. Inasmuch as decision making is a human process which must have an objective, the nature of the objective may determine the validity of specific disciplinary interest as much as the process itself. With regard to the process as an isolated human activity, its study would probably be most appropriately assigned to the realm of the psychologist. This study is concerned with the process in relation to a specific objective, the problem of selecting weapons.

Weapons selection is a process carried out in support and implementation of military policies. These military policies are subsidiary aspects of National Security Policy. In this manner the relationship of the decision making process to National Security Policy is revealed and the singularity of the study established. The decision making process cannot be examined independently of an objective of decision.

Even with the isolation of this one specific aspect of National Security Policy for examination the field has not been narrowed to manageable proportions. In order that adequate attention to the relevent factors may be given it is further necessary to delineate one specific instance of weapon selection for detailed study. The instance selected for this purpose has been the question of the Air Force's B-70 "Valkyrie" bomber program.

Specific decisions examined will be those made within a particular time span. The study will concentrate its attention on the decisions made by the administration of President Kennedy as reflected in that administration's recommendations for amendment of the fiscal year 1962 budget. In this manner it is possible to concentrate upon one single decision, rather than a series of decisions spanning the entire history of the project. The history of the project, including past decisions, will be given, but only for the purpose of providing the background against which the specific decisions under consideration were made.

Thus, the specific purpose may be summarized as the examination of a particular decision relating to the problem of weapon selection. A more general purpose may be stated as the development of an appreciation of the complex nature of the problems of National Security Policy through the detailed study of one of its many aspects.

Importance of the Study

The central position of security to the conduct of national affairs has previously been mentioned. Both the students and practitioners of government, international relations, diplomacy, economy, and the military

arts and sciences, to name but a few areas, must remain constantly aware of the problems of security. Beyond this awareness they must manifest an understanding of the basic aspects of the problem. Several recent works have pointed to the increasingly close relationship which must be maintained between military policy and national policy.[1] Such works have further pointed out that perhaps the military officials have succeeded in manifesting a better appreciation of the political aspects of national policy than have their contemporaries in other governmental departments succeeded in understanding the military aspects of that policy.[2] If this is in fact the case, then a study such as this can be of value in that it makes available in some detail information pertinent to one particular segment of the military component of National Security Policy.

The area of interest may be broadened to include the interested observer who, though he may not carry responsibility for the execution of security policy or be engaged in scholarly attention to the subject, still displays an active interest in the conduct of his government. From this study such an observer may gain an insight into the manner in which that large portion of the federal budget allocated to the Defense establishment is expended for his protection.

Finally, a study such as this can be of value to those individuals whose professional duties require them to engage in some part of the

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[1] e.g., Thomas K. Finletter, Power and Policy. The extensive number of works in a similar vein precludes a detailed listing here. For a comprehensive review of those works referred to in the preparation of this thesis the reader is referred to the Bibliography.

[2] Oskar Morgenstern, The Question of National Defense, pp. 265-71, is but one example.

activities under review herein. As in any other profession the military man often finds himself so beset by a multitude of details and daily routine, by an exclusive concern with immediate problems pertinent to his assignment, that it is with no great difficulty that he loses sight of the broader objectives which he works to attain. It is hoped that the review of a study such as this will be of as great a value to the professional military practitioner as to the student if it helps in redefining the broader goals of National Security Policy.

Limitations of the Study

This study has been subjected to two broad classes of limitations. In the first class are external limitations which have been imposed by the nature of the study. Foremost of these limitations has been that which results from security considerations. Exact details concerning the B-70 bomber naturally fall within the category of military secrets. So too do many of the strategic factors which form part of the basis for the decisions rendered. Yet this has not been a severe limitation. If anything, an investigator might be surprised at the extent of information available regarding both American weapons and strategic planning.

A second form of external limitation might be expected to result from the novelty of the topic. The termination of events which make up the substance of the study precede the compilation of the report of the study by only a very short time period. This limitation is overcome by stating a very important premise to the conduct of the study, which is, that the correctness of the decision is not under investigation, merely the process. Consequently the test of time as to the adequacy or inadequacy of the decision is not pertinent. Nor would a revision of the decision at some future

date affect the validity of the study. Such an instance would be another decision made under another set of circumstances. This study is concerned only with the decision as reflected in actions relative to the fiscal year 1962 budget.

Time span limitation is partially a self imposed one and leads directly to that category of limitation. In addition to limitation of the study to a particular period in time, other self imposed limitations are necessary to keep the study within appropriate bounds. It may be pointed out that the erection of limitations is particularly appropriate in any study related to National Security Policy. As has been mentioned earlier the field of security policy tends to reach out and invest almost every aspect of national life. Such an all-encompassing attribute tends to permit easy diversion from the main point of investigation and encourages wandering from that point into other inviting and interesting aspects of the problem. This is a temptation which must be resisted finaly if the form and coherence of the study are to be maintained. Further limitations mentioned will illustrate but a few of the distractions which must be avoided.

Aside from the question of limitation in time, the first self imposed limitation which must be observed regards technicality. This is not a technical analysis, either of aerodynamic practices or military tactics. The technical aspects of the B-70 are delineated only to the extent necessary to form an appreciation of the capabilities of that aircraft adequate to support the study. The same reservation applies to the technicalities of military tactics. They are mentioned, but only to the extent commensurate with the necessity of understanding the strategic implications of the problems involved in deciding for or against the B-70 as a weapon to support military objectives.

One of the most controversial aspects of any discussion of National Security Policy concerns budgetary limitations. Feelings in this matter run high. Charges have been made that concern for balancing the budget take precedence over the safety of the nation. The defense budget has been variously described as a directed budget,[3] a budget based upon money ceilings rather than military obligations,[4] or simply insufficient.[5] Though the economics of defense, and particularly the budgetary aspects of the problem are of the utmost importance, they again represent a separate aspect of the National Security Policy problem. While in a quasi-peaceful period it is actually impossible to divorce budgetary considerations from the overall problem of defense, some limitation must be imposed to prevent the study from digressing into a field so large and complex that the initial question might be lost sight of in the face of the multitudinous fiscal ramifications. Consequently, some basic assumptions are required to provide limitations within which the study may be conducted independently of these fiscal considerations. The assumption basic to this study will be that the limitations of the defense budget did not actively enter into the B-70 question as a primary factor pertinent to the decisions rendered. The term primary factor must be stressed because in this age of complex and vastly expensive weapon systems cost aspects must of necessity have some bearing on any question. This study assumes that the cost factor was not a primary

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[3]James M. Gavin, War and Peace in the Space Age, p. 170.

[4]Maxwell D. Taylor, The Uncertain Trumpet, pp. 46 ff.

[5]The Rockefeller Panel Reports, "Report II - International Security: The Military Aspect," Prospect for America, p. 149.

consideration. That this is a valid assumption is attested to by a comment by the Secretary of Defense in his testimony before the House Appropriations Subcommittee. Members of the subcommittee questioned Secretary McNamara at great length on this subject. Excerpts from his response give an indication as to his stand on budgetary limitations.

> . . . I do not visualize imposing arbitrary budget ceilings on the services either during or after the development of their budgetary requests and budget programs. At the same time, I visualize very tight financial controls in the sense that I want to be assured we are obtaining a dollar's worth of value for every dollar's worth of expenditure. In a very real sense that is likely to be thought of as a tougher control than any arbitrary budgetary ceiling. It does not have the same connotation and same result as arbitrary budget ceilings. The proposals that were presented to President Kennedy and the proposals recommended to Congress have been made without regard to arbitrary budget ceilings.
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> . . . I have not been deterred in recommending an adequate defense program by budgetary considerations.
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> We must always consider the value we are procuring, the additional strength we are procuring in relation to the cost thereof, but I personally would not hesitate to recommend additional expenditures if I thought by increasing expenditures we could increase materially the strength of our military position and our defenses.[6]

This study will proceed on the assumption that the foregoing quotation presents an accurate description of the relationship of budgetary considerations to national security in the question under investigation.

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[6] U. S. Congress, House, Department of Defense Appropriations for 1962, Hearings before the Subcommittee of the Committee on Appropriations, House of Representatives, 87th Cong., 1st Sess., 6 Parts, Pt. 3, "Secretary of Defense, Chairman, Joint Chiefs of Staff, Service Secretaries and Chiefs of Staff," pp. 9[illegible].

Such assumption automatically subsumes that action on the B-70 question was not motivated primarily by budgetary considerations but rather on the more basic merits of the weapon as they might contribute to national security. In this regard this study prefers to accept the premise established by Mitch and McKean that irrespective of budgetary allocations military decisions are in many of their more important aspects actually economic decisions.[7] The problem is one of optimizing resources, and it is of secondary importance to the technique of solution whether these resources are measured in material, time, or money.

Another important question which must be set aside as without the purview of this study is the problem of the effect of various types of pressures which might affect decisions within the federal government. These pressures may be political, industrial, or as varied as the many special-interest segments which may exist within a pluralistic society. The importance of the problem is admitted, but the problem is not considered within the limits of the study.

The organizational basis of the Department of Defense and the Joint Chiefs of Staff are two facets of National Security Policy which continue to arise in almost any discussion of that policy. The study will make note of the effect of the organizational structure on the decision making process, but it will not concern itself with the relative efficiency of these

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[7] Charles J. Mitch and Roland N. McKean, The Economics of Defense in the Nuclear Age, p. 107. This is perhaps one of the best works available which relates the problems of weapons selection to decision making. Despite the title, the work is not basically a text on economics, but rather the development of a method of analyzing defense problems utilizing principles of economics. Chapter 7, "Efficiency in Military Decisions" is possibly outstanding.

structures. Such analyses are more properly left to the field of management effectiveness.

Congressional action with regard to decisions made with the Department of Defense will be examined but only to the extent necessary to round out the study of the decision making process within the government. The degree of Congressional control of the military is not in itself a subject of the study, but is mentioned as an issue peripheral to the main course of the investigation.

II. ORGANIZATION OF THE THESIS

Importance of Background Considerations

The limitation of the investigation to one specific decision relative to the selection of weapons permits a concise treatment of the main point of the study. Full benefit however, could not be obtained from a review limited to the study of an isolated decision independent of governing considerations. Consequently the analysis of the decision is preceded by a resumé of the more important elements of the background against which the decision must be analyzed. The chapters of this thesis are arranged in such a manner that they may provide the reader with a basic understanding of the various relationships pertinent to the problem. The approach utilized to fulfill this objective is to begin with the most generalized considerations and proceed in succeeding steps to the more particular aspects of the problem. Each step is designed to narrow the field of investigation in such a manner as to permit the reader to arrive at the analysis of the specific decision with an appropriate appreciation of the major factors underlying the decision.

Arrangement of Chapters

The chapter arrangement of the thesis is such as to facilitate the objectives outlined above. Chapter II provides a narrative outline of the relationships existing between security, strategy, and policy. The theory of deterrence, a basic objective of United States policy, is examined to the extent necessary to support an understanding of the necessity of arming the military forces with weapons appropriate to the implementation of that theory. The strategies of counterforce, finite deterrence, and limited war are listed as the primary approaches to the accomplishment of deterrence, and their impact on the question of weapons selection is noted.

In the third chapter various categories of decision are delineated and discussed briefly. Decision categories were chosen as an appropriate means of illustrating the complexity of the problem and the overlapping nature of many of the factors pertinent to weapon selection. The discussion of the various categories serves to tie together many of the seemingly independent fields of study or endeavor which in actuality have a very high degree of interrelationship.

Chapter IV details the problems of determining the appropriate balance of various weapons in the nation's arsenal. This is the problem of determining the "mix." In an effort to assist the reader in recognizing the nature of the problem faced by the decision maker the advantages and disadvantages of the two primary weapons contending for the dominant role in the "mix" are examined. Those two weapons are the missile and the manned aircraft.

From the generalized examination of weapons in the abstract, Chapter

VI undertakes to review the characteristics and history of one specific weapon, the B-70 manned bomber. Those aspects of this aircraft which set it apart from others of the type and which recommend it for particular consideration in the "mix" are detailed in a degree adequate to establish its particular uniqueness. The history of the B-70 is recounted both for its value in illustration of some particular aspects of the decision making process as well as to provide a resumé of past decisions which are of importance in setting the stage for the decision under investigation.

It may be seen that Chapters II through V have been designed to provide a background for the examination of the decision. That decision is set forth in Chapter VI. The reasons underlying the decision are explored to the extent that the sources permit. Methods of arriving at the decision are delineated, and relationships between the varying operative factors are drawn where possible. Finally, Chapter VII provides a brief summation and sets forth such conclusions as are appropriate.

III. HISTORY AND STATUS OF THE PROBLEM

Mention has been made that this study actually encompasses two problems, those of decision making and weapon selection. It thus seems appropriate to examine the history of these aspects of the problem both individually and jointly.

The Decision Making Process

While the ability to render a decision is perhaps one of the basic attributes of intelligence and thus a function which has long been available for investigation, critical attention to the broader aspects of the

process appears to be a relatively recent phenomenon. Wasserman and Silander list few works which pre-date 1939, and the majority of their entries seem to have been written subsequent to World War II.[8] A review of the literature indicates that the field is neither particularly rich in source material, nor do these sources display a comprehensive approach to the problem. It is probably safe to observe that this is not a particularly mature field and that there has not yet emerged a work of pre-eminent stature.

There seems to be a general tendency to orient study or discussion of the decision making process more toward the objective of the decision than towards the process itself. Consequently, a large proportion of information available on the decision making process evolves as a by-product of efforts in a wide variety of fields. The current interest in foreign policy has been particularly productive in this regard. Lerche for instance presents an excellent review of the decision making process in regard to the formulation of foreign policy in which decision making and policy making emerge as almost synonymous terms.[9] Within this same field Snyder and Furniss also discuss the decision making process in detail sufficient to render their presentation appropriate to broader application.[10] Commerce and business management are fields which have

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[8] Paul Wasserman and Fred W. Silander, Decision Making - An Annotated Bibliography, passim.

[9] Charles O. Lerche, Jr., Foreign Policy of the American People, pp. 31-65.

[10] Richard C. Snyder and Edgar S. Furniss, Jr., American Foreign Policy, pp. 89-133.

contributed significantly to the study of decision making, as might well be expected. Jones examines executive decision making and arrives at the simple but cogent conclusion that the decision making process is simply a form of systematized common sense.[11] Another of the more established formats for decision making may be found in the doctrinal military approach, which is embodied in the "estimate of the situation" upon which a commander is taught to base his actions.[12] Various other categories which have been listed as pertinent to decision making include values and ethics, leadership, psychology, and mathematics and statistics. This last field has tended to popularize the "game theory" approach[13] to the study of decision making, although it also might be thought of as including the growing and important field of operations research. Withal, probably the closest approach to a study of the decision making process as an independent activity with applicability to all fields of endeavor is found in Laswell's work which establishes seven categories of functional analysis as basic steps in the decision making process.[14]

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[11] Stanley Howe Jones, Executive Decision Making.

[12] The formulation of an "estimate of the situation" is a military practice of such long standing as to be almost traditional. William J. Harris, "Decision," Military Review, XXXVI, (April, 1956), pp. 33-42, reviews this process and concludes that the estimate is really a mental check-list and not a dogma. He reinforces the obvious conclusion that the estimate cannot substitute for reason and stresses the necessity for thorough examination of alternatives.

[13] A relatively recent work in this field which has achieved almost the status of a latter day classic is John von Neuman and Oskar Morgenstern's, Theory of Games and Economic Behavior. See also Irvin D. J. Bross, Design for Decision, for further insight into the mathematical approach to the problem.

[14] Harold D. Lasswell, The Decision Process: Seven Categories of

In summary it may be said that the history of scholarly attention to the decision making process is relatively short and not marked by particularly strong tendencies to treat the process apart from disciplines already established.

Weapons Selection

As was the case with the decision making process, the problem of weapons selection is one which also probably enjoys a long but not too clearly defined history. As an indication of the antiquity of the problem, Brodie notes that Benjamin Franklin once took under serious consideration the question of bow and arrow as a more effective weapon than the musket for the Continental Army.[15] We may feel fairly certain that the basic problem predates even this early example by many centuries. The practice of weapon assignment is a more specialized form of the broader problem of weapon selection which is more or less implicit in the training of all military personnel. This is indicative of the predominant nature of most of the works in the field, which are generally limited to technical manuals of the military services. Throughout the course of history, particularly in this century the broader problems of weapons selection have occasionally gained the attention of the public. The naval race preceding World War I was characterized by a significant interest in the battlecruiser as an item which enjoyed recurrent public attention. More recently the battleship-aircraft controversy, and after that, the question of the B-36,

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Functional Analysis. Lasswell establishes his seven categories as intelligence, recommendation, prescription, invocation, application, appraisal, and termination.

[15] Bernard Brodie, Strategy in the Missile Age, p. 118.

are familiar high points of public notice of the problems of weapon selection.

But unfortunately, most of the works dealing with questions of this nature tended to degenerate into polemics urging uncritical advocacy of one or another form of weapon without either logical analysis or empirical evidence.[16]

The advent of World War II was accompanied by an understandable increase in the number of works concerning not only military strategy but also national strategy. The character of that conflict was such as to generate an increasing awareness of the interdependence of all sectors of the nation in relation to security. The advent of nuclear weapons was the primary occurrence which focused attention on the specific problems of weapons. This device, accompanied by technological advances in means of delivery, threatened to spread the burden of war over the entire citizenry of a country, if not over the entire world. Battles were no longer events isolated in locale and limited in effect. Such an eventuality could not but help to stimulate an interest in weapons.

Current literature regarding strategy and policy is abundant. Few works fail to consider the impact of weapons and the necessity of relating armaments to objectives. Yet the specific problem of weapon selection is not too frequently examined. This is not meant as a criticism, for weapon selection is perhaps too fine a detail of national security to warrant extensive attention in most works of a general nature. There are, however,

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[16] E.g., Alexander P. de Seversky, Victory Through Air Power.

exceptions. Brodie discusses in an enlightened manner the general problems of weapon selection in regard to strategy and tactics.[17] Mitch and McKean provide an outstanding analysis of the economic aspects of weapon selections.[18] Both note the strong similarity between problems of economics and strategy which is reflected in the process of weapons selection. Kissinger makes the statement that in the 1960's the services will be faced with the problem of selecting from among thousands of possible weapons.[19] Generals Gavin and Taylor relate their experiences and difficulties in the execution of their duties and the inadequacies in United States defense posture to the decision making process. In speaking of the Russian success in launching the first artificial space satellite General Gavin states very specifically "Our failure was in the decision-making process . . . ."[20]

While these and other works provide excellent background, they do not generally engage in specifics as to individual weapons. Current literature does however, begin to relate the process of decision making to the problem of weapon selection. This thesis is partly designed to supplement the existing literature by providing a detailed example of the problem using the B-70 bomber as the illustration.

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[17] Brodie, op. cit., p. 173 ff. [18] Mitch and McKean, loc. cit.

[19] Henry A. Kissinger, Nuclear Weapons and Foreign Policy, p. 224. This is perhaps something of an overstatement, a characteristic of the general nature of the entire work. Though the reader may disagree with the general tendency to overstate problems and the relentless tendency to pursue theoretical logic to the point of overlooking common sense, the work is nonetheless an important contribution to the literature of strategy, defense, and foreign policy.

[20] Gavin, op. cit., p. 14. Taylor, op. cit., devotes an entire chapter to this point. See Chapter VII, "The Failure of Decision-Making: How Military Strategy is Formulated in Fact," pp. 115-129.

IV. SOURCES OF DATA

With the exception of occasional reference to the daily press to support minor items dealing with current historical incidents, primary reliance for source material was placed upon the official publications of the United States Congress. In regard to the explicit statement of the administration's decision in regard to the B-70 and the justification and explanation of that decision, the records of the hearings before the various House and Senate Appropriations and Armed Services subcommittees serve as an excellent source. In fact, considering the time relationship of the decision to the preparation of the thesis, they were probably the only source material then available. Reports of various subcommittees, conferences, and investigating bodies also provided surprisingly adequate source material. In particular, the Senate Preparedness Investigating Subcommittee's report on the B-70 program probably still remains the single most important unclassified document available on this program.[21]

Not only do the Congressional publications furnish excellent material for this thesis, but a word about their value to the average student of National Security Policy might be appropriate. Even a brief review of one hearing before a House or Senate committee concerned with military appropriations will provide an excellent insight into the formulation of policy, the implementation of strategy, and the mechanics of operation of the armed services. They also are of great worth in their illustrations of the actual functioning of the democratic processes in relation to the maintenance of these armed services.

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[21] For more detailed discussion see Chapter V, *infra*.

Technical and professional journals have been consulted in the aeronautical, military, and political science fields. Citation of these sources however, has not been extensive. Primarily such reference has been used to expand upon material originally extracted from the primary sources. The daily press has already been mentioned. Finally, a limited utilization of material found in a very few popular magazines has been made, but such instances are relatively rare and generally reflect a particularly unique viewpoint or interpretation of some basic aspect.

V. METHOD OF PROCEEDING

The procedural methods utilized in the preparation of this thesis have already been discussed to some extent in Sections I and II of this Chapter, and are generally self-evident from the organization of the work. Basically, the process has been one of seeking out pertinent information through a review of the major source material, extracting and presenting that material in a logical manner. The material contained in Chapter VI does represent some analytical process, but not of a critical nature. It must be remembered that the major objective of the work is to present the outline of a specific decision, not the criticism of the validity of that decision. Finally, many of the conclusions contained in Chapter VII are inductive in nature, and generally limited to fairly obvious but nonetheless significant generalizations regarding military and security policy.

CHAPTER II

STRATEGY, SECURITY, AND FOREIGN POLICY

A heightening interest, public and academic, in questions of national security is easily appreciated. The several "revolutions"[1] manifest in mid-twentieth century confront individuals and governments alike with the necessity of radical readjustments in outlook and to a certain extent in ways of life. Having in 1945 emerged from the bitter experience of a modern, global war, mankind was allowed little respite from the rigors of that conflict before it had perforce to face the realization that the war had settled few problems permanently and had spawned numerous new ones. These newer problems were and are the result of political readjustment, changing power relationships, economic imbalances and other radical changes which, if not generated by the war at least seemed to have had their period of incubation greatly accelerated by it.

Nor have the post-war years shown much promise that their characteristic of rapid and radical change are evolving any degree of stabilization. Aside from normal political and economic forces whose interaction might ordinarily and predictably be expected to generate international tensions, demographic factors darken world horizons and threaten eventual invalidation of any short term solution to these problems. Technological advances which in another

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[1] The term is used as a generalization for those aspects of our times which reflect the many changes and advances occurring in this particular period of history. Specifically, three of the utmost significance are the technological revolution, the "revolution of rising expectations," and the evolution of formerly colonial peoples to independent status.

context would be inspiring in their promise for human advancement seem only to intensify the dilemmas of mankind.[2]

The many problems facing civilization today would indeed provide material for an imposing catalogue. But against this background two facts of twentieth-century life stand out in sharp relief--the cold war and nuclear weapons. The former represents the confrontation of two political entities peculiar to the age, the continental-states, successors to the nation-states.[3] Between these two powers has arisen a hegemonial tension[4] in which the more or less predictable power rivalries are further complicated by ideological considerations of unparalleled magnitude. The second fact of modern life--nuclear weapons, imparts to this power and ideology confrontation a criticality which could

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[2]There exists a broad range of contemporary writings examining in detail the circumstances, which are only barely suggested here, from which the researcher may select specific works appropriate to his needs. One of the best sources encountered has been the compilation of studies for the Senate Foreign Relations Committee. See U. S. Congress, Senate, United States Foreign Policy, Compilation of Studies Nos. 1-8, Committee on Foreign Relations, United States Senate, S. Res. 336, 85th Cong., and S. Res. 250, 86th Cong., 86th Cong., 2nd Sess., 2 vols. (Hereafter referred to as Foreign Policy Studies.) In particular see The Corporation For Economic and Industrial Research, Inc., "Study No. 1--Worldwide and Domestic Economic Problems and Their Impact on the Foreign Policy of The United States"; Stanford Research Institute, "Study No. 2--Possible Nonmilitary Scientific Developments and Their Potential Impact on Foreign Policy Problems of The United States"; The Washington Center of Foreign Policy Research, The Johns Hopkins University, "Study No. 8--Developments in Military Technology and Their Impact on United States Strategy and Foreign Policy"; Center for International Affairs, Harvard University, "Study No. 10--Ideology and Foreign Affairs"; and, Center for International Studies, Massachusetts Institute of Technology, "Study No. 12--Economic, Social and Political Change in the Underdeveloped Countries and Its Implications for United States Policy."

[3]The concept of a continental state as a successor to the nation state is from Hans J. Morgenthau, Dilemmas of Politics, p. 179.

[4]See Charles DeVisscher, Theory and Reality in Public International Law, (trans. P. E. Corbett), pp. 75-87 for a discussion of the various forms of political tensions.

conceivably destroy the social fabric of mankind as it is now known.[5]

Thus, through the aegis of the cold war and the nuclear bomb attention has been concentrated upon the question of security and the means for its attainment. Indeed there are those who maintain that the basis for the cold war is actually the differing interpretations of the meaning and essence of security.[6] Whatever the validity of that argument, the fact remains that security has taken on new dimensions with the advent of nuclear weapons. Not only has security increased in importance, but new means to its attainment must be found. The destructive capacity of atomic weapons has, in the opinion of some writers[7] made all-out war an impossible instrument of national policy. With war a less practical alternative, aspects of national activity formerly considered without the purview of a more narrow conception of national security now are encompassed within that term. So it is that economic, social, and psychological factors now intrude into a field which was at one time considered primarily the concern of military endeavor.

In consequence the relevance of strategy and policy have come into a new importance in the literature of the political and military fields. It is

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[5]The terrifying aspects of nuclear war have been examined by several authors. Two of the more provocative yet restrained works are Fred C. Iklé's, The Social Impact of Bomb Destruction and Harrison Brown and James Real's, Community of Fear. It should be noted however that not all researchers accept a completely cataclysmic outlook on the effects of nuclear war. See particularly Herman Kahn, On Thermonuclear War, especially Chap. II.

[6]Alvin Z. Rubinstein, The Foreign Policy of the Soviet Union, p. 204.

[7]Henry A. Kissinger, Nuclear Weapons and Foreign Policy, pp. 1-2, ff. This work is cited particularly in view of its critical examination of both sides of the question and its ramifications. Despite an excellent analysis on which the author based his strenuous advocacy of limited war, that advocacy in many instances seems to be based upon a somewhat too logical extension of improbable circumstances.

not within the scope of this thesis to examine in detail the relationships of political and military strategy. It is important to note however that there is a bond between the two in a modern age which if it does not make them indivisible at least renders the dividing line of the two fields indiscernable at best. Kissinger has presented his readers with a concise and import laden description of the relationships existing in his statement that "it is the task of strategic doctrine to translate power into policy."[8]

This thesis is concerned with a very narrow segment of the relationship referred to above. Specifically, the concern is with the selection of military tools which are one particular form of the physical manifestation of power. This thesis proposes to trace the decision making process in the selection of one particular weapons system. Prerequisite to such a study, however, is an adequate understanding of the inter-relationships of the various aspects of strategy, security, power, and policy. Thus this chapter is designed to trace out (but only in detail sufficient for a basic understanding) those relationships as they bear upon the problems of decision making in weapons selection.

I. FUNDAMENTAL CHANGES

Essential to an understanding of the problems facing the United States in questions of national security is an appreciation of two fundamental changes in the world situation. The first is the tremendous power of nuclear weapons. The second is an essential change in United States vulnerability to enemy attack. Technological advances have forever erased the formidable ocean

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[8] Ibid., p. 4.

barriers behind which the American people enjoyed the opportunity to accomplish unhampered the construction of a political entity unique in world history.

A third element of the world situation of significant moment, particularly so in that it represents a conscious choice of a disadvantage rather than an unavoidable eventuality, is the avowed resolution of the United States government that it will never strike the first blow in a nuclear war.[9] This act of self-denial, no matter how laudable from a moralistic point of view, confronts the national planners with obstacles of signal magnitude. Not only must a military machine capable of destroying any enemy be contrived, but it must be contrived in such a manner that it is capable of absorbing the punishment of a massive nuclear attack prior to exercising this capability.

II. THE PROBLEM

The result of the foregoing considerations is that American leaders are

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[9] President Kennedy has specifically reaffirmed this dictum for the benefit of both the United States and her allies. In an interview with a British reporter for broadcast on British television Mr. Kennedy assured the British audience that ". . . we will not strike first . . . ." See News Item, The Christian Science Monitor, March 27, 1961. In outlining basic defense policies in his message concerning revisions to the defense budget, the President said "Our arms will never be used to strike the first blow in any attack." See U. S. Congress, House, Recommendations Relating to Our Defense Budget, Message from The President of the United States Relative to Recommendations Relating to Our Defense Budget, House of Representatives, 87th Cong., 1st Sess., Document No. 123, p. 2. (Hereafter referred to as Budget Recommendations Message, 1961.) This tenet of United States policy seems to be a particularly sensitive one, possibly because the moral implications do not necessarily coincide with the logic of survival. For an example of Congressional reaction to even the possible suggestion of a departure from this dictum on the part of a governmental official see U. S. Congress, House, Department of Defense Appropriations for 1962, Hearings before the Subcommittee of the Committee on Appropriations, House of Representatives, 87th Cong., 1st Sess., 6 parts, Pt. 3, "Secretary of Defense, Chairman, Joint Chiefs of Staff, Service Secretaries and Chiefs of Staff," p. 80. (Hereafter referred to as House Defense Appropriations Hearings, 1962.)

faced with a task of great complexity and magnitude. In addition to the requirement for the attainment of an adequate defense establishment they must respond to continuing demands that the United States embark on an "aggressive" foreign policy and cease conducting its affairs on a purely "reactive" basis.[10] Considering the strictly military aspects of the world situation it might seem that the attainment of an adequate defense should be an accomplishment worthy of the most gifted military and political genii. Nonetheless, the demands for an aggressive and dynamic policy are not without validity. The world is not a static collection of states but rather a dynamic continuum of forces, and the nation which contents itself with a defensive and reactive outlook will soon find itself overtaken by the sociological and political forces against which the most air-tight military defense can offer no proof.

Logic and the law of nature would suggest that any "aggressive" or "active" policy action by the United States or any other country cannot be undertaken without a firm basis for such action. This is not propounded as a theory but merely a common sense and logical observation which would be equally appropriate in any field of human endeavor whether it be military tactics, politics, or physical science. In the military sense the dictum of protecting your rear would most probably be an appropriate analogy. In the political field it might perhaps conform most closely to "negotiating from strength." In general, it is but another reflection of the caveat of building upon sand.

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[10] Thomas K. Finletter, Foreign Policy: The Next Phase The 1960's, Chaps. IV and VI. This work is especially significant to this discussion in that it closely examines both the need for an aggressive policy and the problems of an adequate national defense.

III. DETERRENCE AS A POLICY

The basic United States philosophy for the resolution of this problem is reflected in the strategy of "deterrence."[11] Although volumes have been written about the many facets and nuances of this strategy it is simply summed up as making an enemy feel certain in his own mind that an attack upon the United States, no matter how successful, will inevitably result in "unacceptable" retaliatory damage to that attacker.[12] There seems to be little argument as to the validity of the objective of deterrence among informed writers in the field of political and military strategy. The question of the best means to attain this objective, and particularly the question of the most effective and appropriate forms of weapons for the embodiment of the means and the strategies which these weapons represent, has indeed stimulated a veritable storm of literary (and other) controversy. Theories of "massive retaliation," "counter-force," "finite deterrence," and "balanced forces" or "limited war capability" have rallied academic, political, and military partisans. Probably seldom in the country's peacetime history have its citizens found such a plenitude of

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[11] In U. S. Congress, Senate, Investigation of the Preparedness Program, Report of the Preparedness Investigating Subcommittee of the Committee on Armed Services, United States Senate, S. Res. 261, 86th Cong., 2nd Sess., "The M-70 Program," p. 1, (Hereafter referred to as the M-70 Report), deterrence is described as a "principle military objective."

[12] This definition is a synthesis of the many propounded by the writers reviewed. It is perhaps most closely allied to the definition in Bernard Brodie, Strategy in the Missile Age, p. 279. The reader may note that Brodie prefers to stress uncertainty in his definition. In deference to the much more limited nature of the discussion in these pages and not in dispute with the excellent exposition of the author, the assumption of uncertainty is preferred here.

strategic exposition available for their consideration.[13]

Full appreciation of the problems to be resolved in the process of decision making in the field of weapons selection requires at least a basic understanding of these theories of deterrence. Consequently it appears necessary at this point to outline the essential elements of each theory.

Possibly the most familiar theory, at least in its title if not in its total strategic implications is that of "massive retaliation." The term is attributed to the late John Foster Dulles, formerly Secretary of State in the Eisenhower administration. Speaking[14] at the Council of Foreign Relations in 1954 Dulles made note of the necessity of reinforcing local defenses with "the further deterrent of massive retaliatory power." The speech also stressed the necessity for the free world to be able to "respond vigorously at places and with means of its own choosing." The speech reported that this was a new national policy resulting from "basic policy decisions" of the National Security Council. The essence of the decisions, he stated, " . . . was to depend primarily upon a great capacity to retaliate, instantly, by means and at places of our own choosing." Dulles himself stated that the purpose of this decision was to preclude the necessity of having to try to meet the enemy's "many choices" and rather to select America's most significant military advantage and fashion strategy and policy around it.

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[13] e.g., Ibid. The sheer number of recent works in this field precludes practical enumeration at this point. The reader is referred to the bibliography for a listing of those works consulted in this research. In the field of periodical literature one of the most widely cited and capable analyses is Albert J. Wohlstetter's, "The Delicate Balance of Terror," Foreign Affairs, XXXVII (January, 1959), pp. 211-234.

[14] Reported in The New York Times, January 13, 1954.

The Secretary pointed out that such a strategy permitted more security at "less cost." Others[15] saw in the promulgation of this doctrine a rejection of the costly and unpopular strategy of the Korean "police action." In the intervening years criticism of this doctrine has not been lacking. Specifically, it has been pointed out that it had been adopted at a time when the United States had lost the nuclear advantage which provided the basic rationale for such a policy. Critics further noted that such a doctrine lacked the flexibility required to adapt to the varying levels of challenge which an enemy, particularly one with the geopolitical and other advantages which are Russia's, might pose.[16]

Despite the many attacks upon it massive retaliation has proven a durable doctrine. While the limitations of massive retaliation as an operational aspect of policy appear to have been rather well expounded, the implication of extensive national destruction which the term embodies remains still the essence of any theory of deterrence. So while massive retaliation may have been discarded as the magic touchstone of cheap and painless containment its spirit endures as the substance of those deterrent policies contrived to constrain the eruption of all-out nuclear war.

At the risk of belaboring the obvious it is perhaps wise to note at this point that in any discussion of deterrent strategies and philosophies it is essential to bear in mind the fact that deterrence is neither an absolute nor constant circumstance, but rather is a relative and variable phenomenon. Because it depends so much upon the mind of he who is to be deterred, deterrence

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[15] Brodie, op. cit., pp. 250-251.

[16] Kissinger, op. cit., pp. 115, 125, 200. Also see Maxwell D. Taylor, The Uncertain Trumpet, p. 6.

partakes of very highly charged psychological considerations.[17] These can be either in the realm of a test of wills or in a delicate attempt to read the minds of various national leaders. Consequently the determination of an adequate deterrence must be the subject of continuous evaluation and reorientation to changing circumstances. It is conceivable that the fact that deterrence is dependent upon so many variables has been responsible for the great amount of discussion which surrounds it.

IV. IMPLEMENTATION OF DETERRENCE

Having paid an obeisance to the intricacy of deterrence and from that genuflection taken heed of the pitfalls ahead, one may next proceed to examine the implementation of the deterrent strategy in the United States. A review of both "independent"[18] authors and writers in military and technical journals leads the reader to visualize a more or less basically three sided battle between the proponents of "counterforce," "finite deterrence," and "conventional" or "limited war" forces.[19] The lines are seldom precisely drawn.

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[17] This factor has been extensively examined by most authors dealing with deterrence. The discussion in Brodie, op. cit., especially Chap. 8, is recommended. The scholarly style and less desperate logic which are typical of the entire work commend it as one of the best, despite the writer's slight over-emphasis on theories of air power.

[18] The term "independent" must be qualified in that most knowledgeable authors in the field have or have had ties either with some office of the Armed Forces or with agencies closely associated therewith. Brodie and Kahn, for instance, are or have been associated with the RAND Corporation, while Kissinger has been a consultant for the Operations Research Office and the Weapons Systems Evaluation Group of the Joint Chiefs of Staff.

[19] Henry A. Kissinger, The Necessity for Choice, pp. 27-40, presents a discussion of the counterforce and finite deterrence strategies particularly in relation to the "missile gap." Also see Kahn, op. cit., passim. Probably the most definitive of all discussions of the theory of finite deterrence may be found in P. G. Raeckus, "Finite Deterrence, Controlled Retaliation," United States Naval Institute Proceedings, LXXIV (March, 1959), pp. 23-29.

There is another group which is perhaps more closely allied with the latter school, but which partakes of all three theories, known as the "balanced forces" school.[20] While the finite deterrence school and the limited war forces more or less readily accept alliance with this group, the counterforce theorists are willing to do so only under the most proscribed circumstances. Participating in this debate with perhaps less claim on the attention but occasionally notable vigor are the proponents of "pre-emptive attack," "preventive war," "broken-backed war," and "strategic surrender."[21]

Stated in a highly oversimplified form, counterforce is basically assuring yourself of a more massive supply of armaments than the enemy.[22] Its immanent characteristic is a bomber for bomber, missile for missile philosophy, with of course a preference for some surplus to insure against unforeseen contingency. Carried to its extreme this concentration on military means can easily lose sight of the ends which the theory was designed to serve.

The manifest distortions which a concentration on a counterforce philosophy can produce naturally cause a desire for an alternate and less

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[20] For an insight into the Army view of the two theories of deterrence as related to the balanced force concept see the testimony of Gen. G. H. Decker, Army Chief of Staff before the House Armed Services Committee in 87th Congress, House, Military Posture Briefings, Hearings before the Committee on Armed Services, House of Representatives, 87th Cong., 1st Sess., especially pp. 171-72. (Hereafter referred to as Posture Briefings.)

[21] The first two are discussed in detail in Brodie, op. cit., Chap. 7; the third in pp. 160-65. See also, however, a more recent estimate of post attack survival requirement in Stuart P. Barber, "Sea Power and American Survival," United States Naval Institute Proceedings, LXXXVII (March, 1961), pp. 51-61. Paul Kecskemeti, Strategic Surrender, presents a detailed study of the problems of surrender both past and present. Chap. 9 is particularly applicable to the grave problems of nuclear war.

[22] Thomas K. Finletter, Power and Policy, p. 7 ff., sets out in essence if not specifically by name an early description of the counterforce strategy in his discussion of "overwhelming atomic-air superiority."

disproportionate means. Possibly as a reaction to the runaway potentialities of a counterforce effort, or possibly as an attempt to tailor military hardware more closely to national objectives the finite deterrence theory has evolved. This theory presumes that there is a certain level of damage which is unacceptable to an enemy. This level of damage can be accomplished by a determinable (finite) number of weapons applied to enemy targets. If a means can be devised to insure the survival and delivery of these weapons no matter what efforts the enemy may undertake, then that specific number of weapons (with again, of course, an insurance factor) will deter the enemy from attacking.

A modicum of reflection will reveal faults in both of these philosophies. To mention only a few objections is to indicate the difficulties. Counterforce in and of itself could stimulate a breakneck arms race and result in national bankruptcy. Exclusive implementation of the finite deterrence philosophy results in a lack of forces to fight a war if deterrence should fail, besides demanding the certainty of invulnerable forces--and certainty is not characteristic of the decade of the sixties. The most obvious drawback of either philosophy is that it commits a nation to the doctrine of massive retaliation--only the means for achieving the retaliation are different, and that difference fundamentally resolves itself into quantity and type of weapons. This limitation creates a concomitant inflexibility in the nation's field of political activity. A nation is committed to all-out war. As a result there is no means to counter enemy provocations of less than an all-out nature. Thus a nation relying exclusively on either a counterforce or finite deterrence doctrine renders itself vulnerable to the enemy's implementation of what Kissinger has termed a "Strategy of Ambiguity."[23] It is this vulnerability that the

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[23] Kissinger, Nuclear Weapons, Chap. 3.

proponents of "limited war" offer to arrive. All-out nuclear war, they aver, has become a rational impossibility. Deterrence is a mutual phenomenon and it acts as a stopper or barrier to the intensity of military activity beyond which neither side proceeds only at the most extreme peril to itself and the world. This in effect is nuclear stalemate, the alternative to which is mutual annihilation. Consequently military adventures must be confined to a more conventional level. If this then is the case, it is on this level that the enemy will act and on this level that he must be met. This confrontation requires the maintenance of conventional or limited war forces of respectable size, maximum power, and extreme mobility. These forces may or may not be armed with "tactical"[24] nuclear weapons, depending upon the particular point of view propounded by variant sects of the limited war school.

While limited war strategies do provide a nation with a flexible response to varying degrees of provocation they provide neither the ultimate deterrent to the threat of atomic destruction nor proof against "escalation."[25]

From this necessarily brief outline of the more popular theories of deterrence it should be obvious that there is no single solution, no ultimate strategy. Specific threats require specific remedies. The requirement for specific remedies leads to the "balanced forces" theory in military doctrine. The term is self-descriptive. On the surface it might seem that a rational objection to the balanced force concept would be difficult to produce. What could be more logical than a defense establishment planned to counter specific

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[24] Low-yield nuclear weapons capable of being employed by and in reasonable proximity to troops in the field.

[25] The danger of the use of ever larger-yield weapons.

threats to the nation? The logic is adequate if not carried to extremes. The implementation of the logic breaks down when tied to the dollar sign and threat priority. Obviously counters to all possible threats would require an immense military investment. There then arises the necessity of evaluating degree and priority of threat and counter-threat. Presuming for the moment that there is a definite limit to what a nation can afford to spend on defense, there is the danger that in attempting to provide several weapons the nation ends up with no single effective weapon. And as one writer has significantly pointed out there is also the very serious possibility that the most dangerous threat might also be the least probable.[27] Thus there arises the necessity of threat evaluation, which is essentially the question of whether it is best to counter the enemy's capabilities or intentions, or to pick some middle-ground. Even if a theory of balanced forces is adhered to, what is the fulcrum upon which the balance is to be oriented?

Stripped of all side issues and reduced to the essential elements, the foregoing represents an outline of the three most popular theories of United States defense strategy. There are indeed peripheral issues and tangential questions which could be explored almost indefinitely. But if the knowledgeable observer will learn well the basic factors so far outlined he will be familiar with the basic premises about which the majority of doctrinal and strategic argument revolve.

Having accepted the strategy of deterrence as the keystone of United States military philosophy it is the task of the decision makers first to arrive at a judgement as to which philosophy most suitably implements deterrence, and;

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[27] Kissinger, Nuclear Weapons, p. 42.

secondly, to select those weapons, those items of military hardware, which most adequately serve both the cause of deterrence and the security of the United States. It is against this background that the study of the B-70 question must be pursued.

Two quotations, though separated by 18 years in time, will assist the reader in maintaining the relationships between arms and strategy as he proceeds further into this study.

> The highest type of strategy . . . is that which so integrates the policies and armaments of the nation that the resort to war is either rendered unnecessary or is undertaken with the maximum chance of victory.[28]

> Only when our arms are sufficient beyond doubt can we be certain beyond doubt that they will never be employed.[29]

Both of these statements reflect the essence of deterrence. Although the reference is only implicit it is possibly more poignant for being so. The years intervening between these two statements have witnessed the advent of nuclear weapons. This coming has not changed the nature of deterrence--but it has appended a terrible necessity for its certain operation.

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[28] Edward Mead Earle, Gordon A. Craig, and Felix Gilbert (eds.), Makers of Modern Strategy, p. viii.

[29] The statement is originally found in President Kennedy's Inaugural Address and was repeated in his 1961 State of the Union Message to Congress. See U. S. Congress, House, The State of the Union, Address of the President of the United States, 87th Cong., 1st Sess., House Document No. 73, p. 7. (hereafter referred to as State of the Union Address, 1961)

CHAPTER III

DECISION CATEGORIES AFFECTING WEAPONS SELECTION

> In making a decision to create a new weapons system, we must consider many things. Foremost among them must be national military policy, enemy weapons systems, our resources, our economy and the state of the technology. All of these are variables that occur in many combinations in the decision making process.[1]

General Gavin wrote these words against a background of a lifetime of military service and extensive participation in the development of new weapons systems. No doubt his list of factors could be expanded, but it is already an imposing recital. A moment's reflection on the General's statement will give at least a preliminary insight into the extensive nature of the problems involved.

In the preceding chapter the relationships of strategy, policy, and security were discussed. This area is of importance in that it provides the context or reference which serves as the background against which other decisions are weighed. Against that background this chapter will examine briefly the nature of weapons systems and delineate some of the multitude of decision categories pertinent to the selection of weapons systems compatible with national objectives and policy.

I. THE NATURE OF WEAPONS SYSTEMS

The term "Weapons System" has come into more frequent usage as an advancing technology has rendered weapons more complex. Although the term may

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[1] James M. Gavin, War and Peace in the Space Age, p. 30.

have a new sound to the lay public, the concept of weapons systems is not new. Indeed the term has long been familiar usage among military personnel.[2] According to one authority

> A weapon system--as contrasted with a weapon--is simply an entity consisting of an instrument of combat, such as an aircraft or missile, together with all related equipment and supporting facilities required to bring the instrument upon its target or to the place where it performs the function for which it was built.[3]

A weapon or weapon system may come into being in several ways.[4] The most common method is for a military service to decide that there is a requirement for a specific type of weapon and have it developed. This is by far the most usual method. In many instances certain weapons are merely refinements

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[2] A particular example may be apropos. The torpedo has been a standard naval weapon for most of this century. It has been employed by submarines, torpedo-boats, destroyers, aircraft, and occasionally by capital ships. Yet each vehicle mounting this weapon represented a different weapon system requiring radically different concepts of attack, launching mechanisms, and fire-control devices. The basic torpedo itself, of course, usually underwent some modifications aimed at making it more compatible with the particular system in which it was to be employed.

[3] Commander J. H. Malley, U. S. Navy, Chairman, Armed Services Procurement Regulation Committee, in testimony before a Senate committee. See U. S. Congress, Senate, Procurement Study, Hearings before the Procurement Subcommittee of the Committee on Armed Services, United States Senate, 86th Cong., 2nd Sess., 2 parts, Pt. 1, p. 99. (Hereafter referred to as Senate Procurement Study).

[4] For purposes of simplicity the term weapon will be used throughout the remainder of this chapter. As used herein "weapon" should be considered to connote either an individual weapon or a weapon system. In reality the inter-relating complexities of modern military technology are such that almost any item, including the individual human being, may be considered part of a weapon system.

U. S. Congress, Senate, Investigation of the Preparedness Program. Report of the Preparedness Investigating Subcommittee of the Committee on Armed Services, United States Senate, S. Res. 261, 86th Cong., 2nd Sess., "The B-58 Program," pp. 12-13, (Hereafter referred to as B-58 Report) lists five general sources of requirements; to avoid obsolescence, intelligence reports, experience of using commands, war games, and experience against newer weapons.

and improvements of existing devices, representing normal technological advances in armament and other industries.

On occasion a weapon may intrude uninvited and unexpected upon the military scene apparently independent of military requirements. In some respects the submarine followed this pattern.[5] It might be said that in such cases the military simply did not realize that they had a requirement, or perhaps that they were not sufficiently cognizant of what marvels the "state of the art" was capable.[6] Perhaps more fairly there are some cases in which technological

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[5]See U. S. Congress, Senate, Inquiry into Satellite and Missile Programs, Hearings before the Preparedness Investigating Subcommittee of the Committee on the Armed Services, United States Senate, 85th Cong., 1st and 2nd Sess., 3 parts, Pt. 1. p. 807. (Hereafter referred to as Senate Satellite and Missile Inquiry.)

[6]Ibid., pp. 791-834, passim. The passage referred to concerns the testimony of Dr. J. Sterling Livingston, Assistant Professor of Business Administration at the Harvard Business School. In his testimony Dr. Livingston made a strong case for the transfer of all basic research to a civilian agency of the government, basing his recommendation primarily on the fact that military officers by virtue of their training and responsibility are more concerned with present readiness than with future potential. He further supported his views by outlining the complex nature of the decision making process in the Pentagon. See also Dr. Livingston's article, "Decision Making in Weapons Development," Harvard Business Review, XXXVI, (January-February, 1958), pp. 126-32. Dr. Livingston has not been the only authority to propound this view. The hearings cited total 2,476 pages of testimony of military, scientific, and industrial experts anent the problems of weapons development, much of it closely akin to these views. Lest it be assumed that the views of Dr. Livingston and those of like mind stand unchallenged the reader's attention is invited particularly to the examination of Dr. Livingston by Senators Symington and Bush (pp. 815-27) and also to a rather strenuous rebuttal by witnesses from the Navy's Research and Development Section, (pp. 1721-62). Although the merits of the question cannot be argued here, it is important that the reader be aware of the very strong differences of opinion in existence. Pertinent to the controversy is the warning against sacrificing present readiness for the sake of future advantage proclaimed by Henry A. Kissinger, The Necessity for Choice, pp. 25-26.

advances manifested in new weapons created their own requirements.[7] For indeed, the day man first flew there arose a military requirement for military aircraft, although the realization of this fact might have been slow in dawning.[8]

Whatever the origin of a weapon, there is the interesting fact that most weapons contain within themselves the seed of a counter-weapon. This seed may be inherent in the nature of the instrument, or in its tactical employment--usually in both. Another significant factor about weapons is their seeming indestructibility. Once having appeared upon the martial scene a weapon is slow in disappearing. The patterns of warfare are such that once outmoded devices frequently enjoy rather surprising renaissance.[9]

The question of armament renaissance is a peculiar one. An old concept may be revitalized in response to a peculiar need, or interestingly enough it

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[7]A contemporary example of a potential weapon in search of a requirement is the WAGMIGHT (Inflatable Rubberized Missile and Aircraft) Program. See U. S. Congress, House, Department of Defense Appropriations for 1961, Hearings before the Subcommittee of the Committee on Appropriations, House of Representatives, 86th Cong., 2nd Sess., 7 parts, Pt. 6, "Research, Development, Test, and Evaluation," pp. 343-53. (Hereafter referred to as House Defense Appropriations Hearings, 1961.) The testimony provides an interesting insight into the relationship of technical possibility, military requirement, and budgetary and administrative practices in regard to this question.

[8]It might be remembered that the United States, the birthplace of manned flight, failed to provide a single combat aircraft in the theater of operations in World War I.

[9]The current central position of rockets in world interest is perhaps the best case in point. A less spectacular instance is the development of body armor for air crews and ground troops. One may also note that in the atomic age bayonets are still an important item of military procurement. See House Defense Appropriations Hearings, 1962, Pt. 5, "Procurement," p. 79.

may arise as the result of a reversion by an antagonist to weapons or tactics considered, for the moment at least, passé. In this regard, considerations possibly unique to a certain field of battle, such as geography or terrain, often play a significant role. Also, the predominant aspect of an antagonist's strength might be the consideration which channels weapons utilization and development in specific directions.[10]

All of this is necessarily part extension and part qualification of the remarks of the preceding chapter. Weaponry is part science and part art. It must be reflective of the national strategy as projected into the future, yet responsive to possible retrogressions necessitated by unforeseen and often unpredictable circumstance of the moment. Weapon selection in time of peace must be based both upon past experience and conjecture of the future, and simultaneously it must retain the capacity for rapid response to unexpected and contingent challenge. Engineers and military men alike often speak of their products as compromises. In the case of weapons however, the compromise often extends beyond the juxtaposition of physical limitations which occur in the laboratory, drafting room, and loft. The responsible military official, however,

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[10] The Korean "police action" is replete with variations on this theme. Although the example can be qualified by political and military factors of extensive ramification one may note the difficulties of a relatively modern armed force against a much more crudely supported opponent. The inability of modern sea and air forces to effect complete interdiction of the most primitive logistic system is of special interest. The almost non-existent North Korean naval forces, concentrating on an old but effective weapon, the mine, combined the advantages of position and the most primitive of techniques in literally stalling the United Nations seaborne investiture of Korean for at least a fortnight. For a more detailed account of naval mine warfare and the problems thereof in the Korean engagement see Arnold S. Lott, Most Dangerous Sea, and Malcom W. Cagle and Frank A. Manson, The Sea War in Korea. Chap. 8 of The Sea War also presents an excellent account of problems of aerial warfare in that encounter.

only begins his series of compromises when the engineer has completed his. Whereas the engineer is assured the certainty of specific parameters attested by the cold figures of his slide rule, the militarist, and the political leader must reach their compromises through the adjustment of much less specific considerations such as capabilities and intentions, possibility and probability, diplomatic maneuver, and on through the stratagems of international politics.[11]

The foregoing discussion of the engineer and the politico-militarist suggests some of the basic divisions inherent in the nature of weapons selection problems. Unfortunately the divisions are not all so basic, for there are a multitude of facets to the problem of weapon selection. Each sub-set of problem areas generates the need for a host of decisions. Further complicating the picture is the fact that the problem areas do not submit to easy categorization. Classification is complicated by the overlapping nature of the problem areas on the one hand and an all-pervasive nature on the other. Indeed, General Gavin only hinted at the intricacy of the situation when he spoke of the "variables that occur in many combinations." A delineation of the variables, specifically the categories of decisions, will help in understanding the problem. The combinations will suggest themselves.

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[11] The approach of the Executive Department of the government to just such problems was outlined by President Kennedy in his State of the Union Message. State of the Union Address, 1961, pp. 6-10. For specific details of the implementation of this approach see the testimony of the Secretary of Defense, the Service Secretaries, and the military Chiefs in the hearings before various Congressional committees as listed in the bibliography. Specifically, see testimony of Secretary of Defense Robert S. McNamara in U. S. Congress, Senate, Military Procurement Authorization Fiscal Year 1962, Hearings before the Committee on Armed Services United States Senate, 87th Cong., 1st Sess., pp. 2-5. (Hereafter referred to as Senate Military Procurement Authorization Hearings.), and; Posture Briefings, pp. 633-35.

II. CATEGORIES OF DECISIONS

Conceptual or Theoretical Decisions.

This particular field of decision making has been mentioned above in the discussion of the nature of weapons. It is the phase of the general formulation of requirements.[12] In many cases the requirement or need will be obvious, often painfully obvious.[13] In other instance it may be less certain.[14] As previously noted an existing system may suggest the need for a replacement, or the stimulus may come from a variety of sources. Requirements which suggest no radical departures from contemporary scientific or engineering levels of achievement require only to be examined critically from the standpoint of actual need or financial outlay. In an age of burgeoning technology, however, more and more requirements demand decisions as to actual feasibility.

Feasibility Decisions

The determination of feasibility requires an accurate appreciation of the present and future capabilities of science. It also demands a similar

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[12] U. S. Air Force Regulation No. 375, Systems Management, 5 parts, (Hereafter referred to as AFR 375-1 through 5) establishes three phases for a Weapon System life cycle, namely; Conceptual, Acquisition, and Operational. The conceptual phase is defined as "that period which terminates not later than publication of a Specific Operational Requirement." See AFR 375-1, Weapon/Support/Command and Control Systems Management, p. 2. Particularly significant in this definition is the fact that only a terminal, not original, designation of the time span of this phase is specified, perhaps in recognition of the nebulous character of the origin of an idea.

[13] E. g., the need for the rapid procurement of large numbers of amphibious vessels for the prosecution of World War II.

[14] Reflection on the rapid and unpredictable advances in science and technology in company with the long lead times required for modern arms will give an indication of the heavy demands upon the foresight of the scientist and the soldier.

appreciation for the industrial technology of a nation. But further, it requires a constant, aggressive pressure on the frontiers of scientific and technological knowledge in order that the range of feasible weapons be constantly expanded. Thus the decision maker, working with the most advanced weapons, is continually faced with the problem of equating today's limitations with tomorrow's possibilities. Ten years ago, during the period of the Korean war, it is doubtful that the average citizen really gave much thought to the problems posed by placing a man on the moon or in orbital flight. But today it is a real and present problem. Thus may be seen the importance and the difficulty of decisions relating to feasibility.

It is not difficult to compile a record of horrible examples of egregious decisions as to practicability of new weapons,[15] or for that matter in any other field of endeavor which is affected by scientific progress. It is sufficient to point out that in the era of the atom and the ballistic missile man's inherent fallability carries a rising price tag in time, treasure, and security.[16]

Usually, unless feasibility concerns tactical or technical innovation in the use of an existing weapon, feasibility decisions are not in the hands of the military or political, but rather are referred to scientists and engineers. This alliance perhaps highlights a consideration which is implicit in any discussion of modern weaponry and which has already been touched upon

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[15] Ord Rees, The Manned Missile, pp. 162-64, lists such eminent scientists as Vannevar Bush, J. Robert Oppenheimer, and Theodore von Karman as stating or inferring the impossibility of ICBM's, the hydrogen bomb, and supersonic flight, respectively. Cf. supra, p. 6.

[16] Ibid., p. 163. Rees points out that scientific opinion as to the impracticability of ballistic missiles resulted in the expenditure of two billion dollars on the development of "air-breathing" missiles and a delay of two years in development of the Atlas missile.

slightly. As the inter-dependence of science and the military grows the question of the administrative organization necessary to attain maximum benefit from this relationship assumes singular importance.[17] This scientific-military relationship has probably existed since man first aspired to conquer both his environment and his neighbor. The present day extent of this relationship, however, represents a political and sociological phenomenon not without significant implications.

Obviously, feasibility studies include technical decisions. Just where the dividing line between science and technology rests is perhaps a moot point, but an awareness of the relationship leads to the next category of decisions.

Technical Decisions

For the purpose of this discussion technical decisions are those of a less esoteric nature than the feasibility decisions (which are based more upon basic science than upon engineering practices) referred to in the preceding paragraph. It is possible that technical decisions alone account for by far the greatest number of arbitrements in the entire decision making process. These may range in importance from whether a clock on an instrument panel shall

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[17] Senate and Satellite Missile Inquiry, deals extensively with this problem. A less lengthy, but perhaps more specific investigation into the same problem may be found in U. S. Congress, Senate, Organizing for National Security, Hearings before the Subcommittee on National Policy Machinery of the Committee on Government Operations, United States Senate, 86th Cong., 2nd Sess., 7 parts. See particularly Part II, "Science, Technology, and the Policy Process," p. 247. (Hereafter referred to as Senate Security Organization Hearings.)

be mechanical or electrical, one-day or eight-day,[18] to whether or not a new class of ships shall be conventionally or nuclear powered. Clearly, as the magnitude of the technical decision grows the more it tends to escape from the narrow bounds of its own category and overlap into others. In a decision as complex as nuclear vs. conventional ship power, the entire gamut of decision categories enters into play.[19]

Technical decisions and the technical complexity of weapons relates to one of the most serious of all problems in the field of weapons development--the problem of lead time. Estimates of lead time requirements range from five to ten years for a modern weapon. Not all of this lead time can be attributed to technical intricacy. Perhaps as much as fifty per cent of the lead time results from administrative drag. But whatever the ratio of productive momentum to administrative inertia, there is a basic time span from drawing board to operational status. In specific instances efforts to reduce this time span have been met with certain notable successes, but essentially, growing lead times are coeval with growing complexity.[20]

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[18] A specific and very extreme example. See Senate Satellite and Missile Inquiry, pp. 798-99. As described in the citation this incident reflects very gravely the problems of organizational structure and their relationship to the decision making process.

[19] An extensive discussion of this particular subject is contained in House Defense Appropriations Hearings, 1962, Pt. 6, "Nuclear Propulsion, Appropriation Language, Amendments to the Budget, 1962, Statements of Members of Congress, Organizations, and Interested Individuals," pp. 1-55, especially pp. 16-17.

[20] The literature on the technical and administrative aspects of, and dangers inherent in growing lead times is most overwhelming and possible citations seemingly unlimited. For the purposes of this thesis however, the testimony contained in the Senate Satellite and Missile Inquiry, and particularly that of Dr. J. Sterling Livingston (cf., supra n. 6) is of sufficient scope to illustrate the majority of situations. This testimony points out that average United States weapon development consumes on the average of 10-11 years as opposed to 5 years for Russian weapons.

Administrative Decisions

A necessity to make a basic delineation arises at this point. This chapter is concerned with categories of decisions, of which administrative decision is but one. As noted to such great length in the sources cited, the efficiency of the decision making process is particularly sensitive to the administrative arrangements which shape it. These administrative arrangements are in the province of organization and management control. While recognizing the critical nature of these areas in the decision making process, it is also necessary to avoid the danger of being diverted from the main purpose of this chapter, which is the categorization of types of decisions. This section deals simply with administrative decisions, not the administrative aspects of the decision making process. The distinction is important and must be observed if the discussion is not to be lost in the highly intricate managerial and organizational aspects of the administration of national security. An observation by Admiral Rickover will attest to the importance of the area, and allow resumption of the basic discussion. Speaking of the "technological race" between the U. S. and the Soviet Union, the Admiral said:

> In essence, the contest is really between two different systems of administration; between two different bureaucracies. If we place the issue on that basis, if we stop talking about a contest between democracy and totalitarianism, we can get at the root of the problem and find out why their rate of progress is greater than ours, why they are getting ahead of us.[21]

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[21] U. S. Congress, Senate, Missiles, Space, and Other Major Defense Matters, Hearings before the Preparedness Investigating Subcommittee of the Committee on Armed Services in conjunction with the Committee on Aeronautical and Space Sciences, United States Senate, 86th Cong., 2nd Sess., p. 161. (Hereafter referred to as Major Defense Matters, 1960.)

It is perhaps tautological to state that complex weapons generally require complex organizations for their management. Certainly there can be no doubt that administration of the Armed Forces and the Department of Defense represents a management challenge of significant dimensions. The Armed Forces account for approximately one half of the federal budget.[22] To insure that the public funds are not subject to mismanagement very specific procedures are established for their expenditure.[23] It is the fulfillment of these procedures which accounts for a very large number of the administrative decisions concerning weapons. Contracts must be awarded, either on a competitive or negotiated basis. Capabilities of contractors must be evaluated, and decisions made as to whether or not these capabilities are sufficient to permit the accomplishment of the task on which he has submitted a bid. Complicating this procedure are certain statutory requirements relating to the amount of federal expenditures which must be apportioned to "small" businesses, diversion of work to "depressed areas," and such.[24] The fact that public funds are being spent for weapons establishes a completely separate category of decisions apart from those which would be normal in a private endeavor.

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[22] Appropriations as requested by President Kennedy for fiscal year 1962--$42,942,345,000. U. S. Congress, House, Department of Defense Appropriation Bill, 1962, 87th Cong., 1st Sess., Report No. 574, p. 1. (Hereafter referred to as House Defense Appropriation Report, 1962.)

[23] E. g., see Senate Procurement Study. Also see U. S. Congress, House, Study of the Armed Services Procurement Regulations and Departmental Implementation Thereto, Hearings before the Subcommittee for Special Investigations of the Committee on Armed Services, House of Representatives, 85th Cong., 2nd Sess., 1. Ses. 87. (Hereafter, House Procurement Study, 1958.)

[24] House Defense Appropriation Hearings, 1962, Pt. 5, "Procurement," pp. 60-62.

Decisions contingent upon the disbursement of public funds, however, are not the only administrative decisions entering upon the scene. Concurrences must be obtained from interested and cognizant offices within the particular military establishment and the Department of Defense.[25] Frequently liaison must be established with other services and even with services of allied nations. Particularly in the case of air and space weapons, liaison with non-military agencies of the government is mandatory. Priority assignments are but one of many other administrative decisions which must be resolved.

The foregoing only hints at the complexity of the administrative problem. The very complexity has given rise to a very special kind of administrative decision--the decision as to whether for some particular reason of priority or national need a certain program shall be taken out of the normal administrative chain and established as an autonomous organization within the parent body but with its own streamlined procedures. The Navy's Polaris program was accomplished in such a fashion.[26] This is a delicate decision, for an excessive number of independent entities within an organization could soon destroy its organizational basis.

Financial Decisions

Probably no area of decision making in relation to national security has given rise to so much discussion, acrimony, and bitterness as has that of finance. Questions in this field range from the broad generality of how much

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[25] Senate Satellite and Missile Inquiry, p. 704.

[26] Ibid., pp. 771-90 presents a detailed account of the organization of the Polaris program.

the nation can afford to spend on defense to specifics as to costs of lamp-sockets or hand tools.[27] Obviously more complex weapons, resulting from scores of advances, will result in rising costs. There seems to be an inflation of technical complexity proceeding hand in hand with the much discussed financial inflationary trend. These two very basic factors cannot help but reinforce one another in raising weapon costs.

Problems of financial decision can be separated into two major aspects, although as in all attempts at simplification there is danger in overlooking many important though subtle nuances of the problem. The first major aspect is that already mentioned; how much can the nation afford? The second aspect of the problem is, either independently or in conjunction with the former; are the more complex and more expensive weapons, per se, the best for the national arsenal? Is it better to have many good weapons than a lesser number of the most advanced, and theoretically, best? If a limit is established on the over-all amount of funds available, the problem may require an extremely weighty decision. With a limitation on funds, weapons must be selected not on their own merits entirely, but in competition with other types of weapons and on a scale of finely devised priorities.[28]

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[27] In the former case an excellent study of defense costs and the nation's ability to support them is contained in The Rockefeller Panel Reports, "Report II - International Security: The Military Aspect," Prospect for America, specifically Chap. XI, pp. 149-153. Evidence of Congressional concern for even minor items is indicated, with specific examples, in House Defense Appropriation Hearings, 1962, Pt. 5, "Procurement," pp. 660-75.

[28] Although it is only natural for a responsible military officer to desire the best weapons the nation can possibly supply, and these in large quantities, the rising costs of weapons have stimulated a reappraisal of this heretofore little challenged characteristic, even within military circles. See, for instance, William G. Jones, "Safety in Numbers," United States Naval Institute Proceedings, LXXXVI, October, 1960, pp. 55-62 and Joseph E. Muzzio, "Disaster Through Glamor," United States Naval Institute Proceedings, LXXVII, July, 1961, pp. 46-53.

Inasmuch as many weapons represent a specific line of strategic thinking which in turn can be colored by service experience and loyalty, the possibility of vigorous contention between various branches of the Armed Forces should be obvious.[29] It appears safe to assume on the basis of logic alone that under peacetime conditions there can be few if any decisions which do not reflect some influence of the financial aspect.

Adaptive Decisions

For a number of reasons, partly because of long lead times, partly as the result of the rapid advances being made in science and technology, and for numerous others such as changing strategic orientations or changes in military tactics, frequent review of the status of a weapon in the defense scheme is required. Such a review may indicate need for acceleration of development or an increase in inventories. It might also indicate the abandonment of a weapon. In the latter case the decision may become particularly agonizing if large sums of money have been spent and major organizational changes have been executed to accommodate the weapon. The dynamic nature of forces at work in the world appear to make adaptive decisions more necessary.[30] Such decisions often require great foresight, much courage, incisive action, and possibly ruthlessness. At the very least, aside from these personal characteristics, they require

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[29] Maxwell D. Taylor, The Uncertain Trumpet, pp. 115-29, outlines the specific problem. Particularly entertaining despite its ominous overtones, is his "Parable of the Unhappy Mess Sergeant," pp. 124-27.

[30] In effect, President Kennedy's instructions to his Defense Secretary are an example of this type of decision on a large scale. See Senate Military Procurement Authorization Hearings, 1962, pp. 1-5. Specific instances may be seen in the Navy's cancellation of its Lighter Than Air (Airship) program. Posture Briefings, p. 969.

that the decision maker have the proper balance of authority and responsibility.

Political Decisions

Let it be assumed for the present that a proposal for a weapon has progressed through the various categories of decisions enumerated. Let it be further assumed that in this difficult journey no strictly logical reason for not developing the weapon has presented itself, and that significant advantage of a strategic nature will accrue to the nation through its possession. Should not acquisition of such an instrument then proceed forthwith? Sheer logic might dictate an unqualified affirmative. But there frequently exists another category of decisions to which the proposal must be submitted. For lack of a more precise appellation let this be called the area of political decision. In it are grouped all of those considerations which might be logically extraneous, but whose influence is of significant import when the ultimate decision is removed from the somewhat narrow limits already reviewed and placed against a broader background. It is conceivable that some factor of special interest may intrude under this heading. Partisan politics, particularly during the period of an election, can color a decision. Several other factors could be active. But in this discussion it is the more broad connotation of the word political that is intended.[31]

One of the most important considerations facing the decision maker is world opinion, and in a narrower sense, the enemy's opinion. The very tenuous nature of deterrence, its "ultimately frangible"[32] rationale, demands a

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[31] The reader will remember that the decision to build the hydrogen bomb was, in the final sense, a political one.

[32] Bernard Brodie, Strategy in the Missile Age, p. 250.

comprehensive logic. In the riddle of deterrent strategy it is not inconceivable that defensive preparations may be misinterpreted by the enemy and trigger the war they have so painstakingly been fashioned to deter.[33]

Certain weapons have traditionally carried an aura of repugnance about them. Perhaps the most obvious example is that of poison gas. Logic points out that it is no more inhumane, possibly less so, than other weapons.[34] Yet world powers have refrained from its use since World War I. Bomber aircraft have similarly, although never so violently, been the subject of popular aversion. Both the implied and demonstrated consequences of mass bombardment of civilian populations provide adequate basis for humanitarian objections to their utilization. Defensive weapons have always been more popular, politically, than offensive weapons.[35]

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[33] "There may be," says Professor Thomas C. Schelling, " . . . not only secrets we prefer not to keep, but military capabilities we prefer not to have." Quoted ibid., p. 302.

[34] E. g., "There are a few things in Washington that one just does not talk about."

"One is chemical, biological, and radiological warfare." Lead from news item, The Christian Science Monitor, June 20, 1961. Chemical, biological, radiological warfare (CBR) is the common military term for the employment of gases, germs, radiation and other insidious devices which in simpler times would have come under the generic term of "poison gas." See also House Defense Appropriation Hearings, 1962, Pt. 4 "Research, Development, Test, and Evaluation," pp. 223-47.

[35] Military men are traditionally agitated by well meaning efforts to classify weapons or concepts too strictly as offensive or defensive. Note the comments of Admiral Burke in this respect.

> A marine with a rifle in his hand is either offensive or defensive, depending, not upon the rifle, not upon the use to which the rifle is put, but the use to which the marine is put. And he is probably offensive, I might add. (Laughter.)
> But it is too easy, and it is wrong, to divide elements of military power into offensive and defensive categories. Particularly is this true when the power is mobile. Posture Briefings, p. 91.

A political consideration which has come into much recent prominence is that of prestige. Weapons or other devices may be procured not on the basis of strict need, but rather to elevate the prestige of a nation in the eyes of the world. There may be sound reasons for this endeavor, or it may be simply the manifestation of vanity on the part of a national leader. The present day space race poses the question of prestige as opposed to necessity.[36]

In consequence, weapons may be subjected to decisions of a political nature which might contravene the narrower technical and tactical logic demanding their production.

Command Decisions

The title is perhaps a misnomer as its applicability is intended to extend to both civil and military decisions. The term admittedly has specific military overtones. Nonetheless it suggests itself as the description most suited to those final and ultimate decisions upon which the fate of the nation might rest. In the military sense it denotes the ultimate in responsibility. A clue to its applicability may be found in a passage from Navy Regulations:

> The responsibility of the commanding officer for his command is absolute . . . The authority of the commanding officer is commensurate with his responsibility . . . .[37]

This passage and its implications has long given pause to naval officers as they reflect upon their duties and the demands of their service upon

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[36] This should not be taken as averring that the space program is not a necessary one, but rather as recognition that there does exist difference of opinion as to the validity of some of the aims. N. Y., see news item, The Washington Post, June 2, 1961, and; "Common Sense--in Space," editorial, The Christian Science Monitor, June 5, 1961.

[37] U. S. Navy Regulations, 1948, p. 81.

them. The precepts of the other services are of similar import if not exact wording.

In the sheer finality of the assignment of responsibility which the term connotes it somehow does not seem inappropriate to include under such a heading the very serious responsibilities of both the civil and military officials who share the burdens of weapon selection. In such a sense it is used here. "Command Decisions" seem more succinctly to delineate the nature and magnitude of these responsibilities than any other which might be brought to mind.[38]

Command decisions are those of an ultimate and final nature. They are decisions which allot huge amounts of national wealth to the development and procurement of a weapon or indicate that the security of the nation does not require such a weapon. They are decisions of vast economic and social import. They are the result of all of the subsidiary decisions in the decision making process which they ultimately affirm or negate.

A review of the categories of decisions involved in weapon selection indicates that each individual decision eventually becomes a factor in the ultimate decision. As was mentioned, any one specific category of decision can seldom exist uninfluenced by one or more of the others. In this sense the categories are merely reflection of the variant factors influencing the final decision. This categorization provides an insight into the nature of the decision making process. It suggests that it is a process of judging the balance of various factors. The consequences of the decision, however, require that the scales be read accurately and that the weights be precisely calculated.

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[38] In this respect note the comment of Gen. J. B. Medaris to the effect that "Some place there has to be one man who can make a decision, who can give a command, and who has the resources to carry it out." Remote Satellite and Missile Inquiry, p. 600.

CHAPTER IV

WEAPONS SELECTION--ADDING THE MIX

Chapter II outlined the problems confronting the national planners in the determination of a military strategy commensurate with national power and national objectives. The basic tenet of United States strategy was identified as one of deterrence. The problem of deterrence as reflected in contemporary analyses subdivides into the deterrence of all-out nuclear war and the deterrence of limited small scale wars. Both aspects of the problem must be served by adequate solution in the form of a properly oriented and constituted military establishment if the nation is to retain the flexibility necessary for meeting the varying contingencies of political maneuver in the era of the cold war.[1]

In the main this study is concerned with the selection of the means of deterrence of an all-out war, that is, the selection of the strategic deterrent. Concentration of attention on this aspect should not be viewed as a derogation of limited war requirement, but simply as an attempt at isolation of one particular aspect of the over-all problem. The philosophies of counterforce and finite deterrence[2] have been examined briefly as they relate to the problem of deterrence. Those differing philosophies of course presume that a decision has been made that the primary defense against an all-out nuclear attack shall be placed upon a capacity for massive retaliatory action, although

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[1] In this regard see Maxwell D. Taylor, The Uncertain Trumpet, pp. 6-7 ff. for a discussion of his proposal of a strategy of "flexible response."

[2] Cf. supra, chap. II.

it does not necessarily follow that the doctrine of "massive retaliation" in its narrowest sense is the sole operational component of deterrence.[3] Basically then the problem of deterrence is the attainment of an assured capability to deliver a specified minimum amount of nuclear destruction upon enemy targets. By such a capability will the enemy be deterred from venturing an attack upon the United States.[4]

I. THE INSTRUMENT OF DETERRENCE

In the present age the means of delivering this destruction is some form of aerial bombardment.[5] Two primary contenders for this task are the ballistic missile and the manned aircraft. As technology advances there arise possibilities for a combination of the two. Advocates of each weapon divide into varying schools of thought as to particular means of implementation and utilization of these tools. But despite the variations, manned

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[3]Care must be taken to prevent confusion of the term "massive retaliation" as a national strategy or military doctrine with the more simple use of the term which implies a type of tactical response with nuclear weapons to an enemy attack.

[4]Affirmation of the theory of deterrence as the primary United States strategy with regard to all-out war may be found throughout the many congressional hearings on the subject of military posture and defense appropriations. It is interesting to note that the House Appropriations Committee in reporting on the bill for defense appropriations for fiscal year 1962 stressed very heavily the deterrent aspects of the nation's defense organization. See House Defense Appropriation Report, 1962, pp. 4-12.

[5]There is no intention to ignore the possibility that atomic weapons may be smuggled into the country by commercial aircraft or cargo vessel. The advantages accruing in a strategic or tactical sense, however, from such an effort are negligible and discussion of such activity may be relegated to the more sensational Sunday supplements. The term aerial bombardment as used here does not differentiate the means of launching the weapon.

aircraft and missiles remain the two basic themes. It is the purpose of this chapter to examine the characteristics of these two instruments; to examine into the advantages and disadvantages inherent in each; and in this process to delineate the factors pertaining in the determination of what was popularly come to be known as "the mix."[6]

During the course of this investigation the reader will be well advised to bear in mind the categories of decisions pertinent to weapon selection which were outlined in the preceding chapter. The factors which these categories represent are at all times active and contributory to the final decisions which must be resolved. But before undertaking this exercise it is necessary to examine certain considerations relating to the question but which must be isolated from this discussion in order that the desired degree of specificity may be maintained.

The Role of Seaborne Air Power

For many years disputation has ensued between proponents of air power and various other forms of military force. Perhaps no area of this controversy has been more bitter nor achieved more public notoriety than that between what for purposes of simplicity might be called the "big bomber" and the "super carrier" schools of thought. The intensiveness of this conflict has been

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[6]The controversy surrounding missiles and aircraft which pervades the hearings on the fiscal 1962 defense budget does not arise from the possibility of adoption of one to the exclusion of the other, but rather from differing opinions as to ratio and rate of change. This in essence is the problem of "the mix." The importance of this concept may be judged by the frequent reference to the problem by defense officials. For just a few examples see Senate Military Procurement Authorization Hearings, 1962, p. 210; Major Defense Matters, p. 71; Posture Briefings, pp. 114, 650; Senate Satellite and Missile Inquiry, p. 765. The interested observer may find thought provoking the reflection that air power enthusiasts whose almost historic mission has been to get more bombers into the defense establishment are, within almost the same generation, now faced with the fight to keep them there.

aggravated if not altogether generated by a more or less historic competition for a limited amount of funds available to the defense establishment.[7] The objectives of this investigation do not require an entry into this controversy. The question of the role of sea power in any nation's history is much too broad a field of inquiry to be covered within the very specific limits of this work. Consequently, except for tangential questions such as the relative advantages of seaborne launching platforms for ballistic missiles and similar considerations, an analysis of the role of sea power will not be undertaken. In the face of the necessity of recognizing its relevance to the problems of national security, however, let it be appreciated that any discussion of manned aircraft in the nation's deterrent posture includes seaborne aircraft launched from aircraft carriers, which aircraft partake in some degree the various advantages and disadvantages of all other manned aircraft and differ primarily in the characteristic of their basing arrangements and the technical variations necessary to adapt them thereto. Seaborne aircraft are a part of

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[7]Two incidents in United States history stand out as high points in the dispute between advocates of air power and sea power. The first, which marks the emergence of the dispute to public attention, was the sinking of an ex-German battleship by Army aircraft under the command of General "Billy" Mitchell in a controlled test off the Virginia Capes in 1921. The second event was the famous controversy centering around the Air Force's B-36 bomber and the Navy's "super carrier." Whether or not the latter incident marked the termination of the dispute is highly problematical although there has been an apparent trend in military thought to the appreciation of the futility of reliance upon one principal weapon to satisfy the nation's defense needs. A short description of the tests mentioned and an analysis of theories of air warfare up to mid-World War II is contained in Edward Warner, "Douhet, Mitchell, Seversky: Theories of Air Warfare," Earle, Modern Strategy, pp. 485-503. For those interested in a concise but scholarly and comprehensive study of the evolution of air power strategy and the implications of atomic weapons see Brodie, Strategy, pp. 21-222. Kissinger, Nuclear Weapons, pp. 85-2[illegible], 231, 233 deals with the B-36 controversy and relates it to strategic considerations in the atomic age.

the nation's manned aircraft arsenal and are supplementary to the employment of strategic air power. Although this categorization may not do justice to the complexity of the problem it is necessary to so delineate the question in order to maintain an adequate continuity and reasonable limitation of the study.[8]

Weapons Evolution and "The Mix"

Manned aircraft, specifically manned bombers, have traditionally constituted the back-bone of offensive air power. Science and the military have long sought a way in which to reproduce by mechanical device the capabilities of the human being in directing such weapons to their targets. The objective of this search has been two-fold: First, a desire to increase the probability of penetration to and accuracy of delivery upon the target, and second, an attempt to reduce the toll of life required in an effort by a manned vehicle to approach the target. Within the last several years this capability has been achieved, or so nearly achieved, that the union of an unmanned delivery system and a payload of destructive power of the magnitude of nuclear warheads has resulted in an "ultimate" weapon. The development of this type of weapon has generated a controversy as to the relative importance of this new armament, the ballistic missile,[9] and the manned aircraft in the nation's deterrent force.

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[8] Two excellent and recent works dealing with sea power are Bernard Brodie, A Guide to Naval Strategy and Anthony H. Sokol, Sea Power in the Nuclear Age.

[9] An examination of terminology may be helpful at this point. In the lay mind confusion often exists with relation to the terms "guided missile" and "ballistic missile." A guided missile is one which responds to commands from either an internal or external source to maintain its motion along a desired flight path, sometimes referred to as the "mission profile." A ballistic missile is one which follows a flight path governed by basic physical

Despite the awesome potentialities of both weapons, the variables entering into any scientific or human endeavor, including war, are such as to require a rational strategic planner to utilize the capabilities of both systems. The question of how many of each, both relatively and absolutely, is the determination of the mix. Understanding of the problem requires an examination of the capabilities and limitations of each system.

II. THE CASE FOR MISSILES

Advantages

The intercontinental ballistic missile armed with a nuclear warhead has been described as the ultimate weapon. Its most significant advantage lies in the fact that there is no presently known practical defense against such a weapon.[10] In tactical parlance, the ICBM assures the highest

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laws much in the manner of a projectile fired from a rifle or artillery piece. In actual practice a ballistic missile receives some guidance, usually from an internal inertial guidance system, during the initial phases of launch and booster operation. This is necessary both to stabilize the missile and place it in the proper orientation to assume its desired trajectory. Once this very brief phase is completed the ballistic missile flight is as independent of control influence as is the artillery projectile after leaving the bore. Further developments in missilry may modify this description but it is sufficiently accurate for present day systems. In the field of offensive warfare ballistic missiles have in the main replaced the earlier "air-breathing" guided missiles except for very specific tactical purposes.

[10] For a discussion of the probability of achieving an effective defense against missile attack see The Washington Center of Foreign Policy Research, The Johns Hopkins University, "Study No. 8 - Developments in Military Technology and Their Impact on United States Strategy and Foreign Policy." Senate Foreign Policy Studies, Vol. I, pp. 737-40. The Nike-Zeus anti-missile system represents the closest approach to date to a defense against ballistic missiles. For a brief non-technical description of the system, plans for operational testing, and a resumé of the tenuous state of the program see feature article, The Christian Science Monitor, April 6, 1961.

probability of penetration to the target of any weapon ever devised. This weapon brings a new and comprehensive meaning to the term "World War"--a war in which the contestants can engage one another at "intercontinental" ranges. In theory at least the weapon is unaffected by the vagaries of weather and other circumstances which may modify or reduce the effectiveness of older arms. It may be maintained in instant readiness awaiting only the touch of a button to unleash it against a selected target.[11] In the classical struggle of the offense and the defense, the offense seems to have outdistanced the defense by a stride of great magnitude.[12] Possible defenses apparently must await basic new discoveries in the fields of science and technology. In the interim,

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[11]The reader must realize that the advantages being described are attributable to missiles only under optimum conditions. A certain amount of generalization is required in relating technical capabilities to the over-all strategic picture. From the purely technical standpoint there are indeed inherent difficulties in the employment of missiles. The "instant readiness" referred to in the text of course presumes that the missile in question utilizes a solid propellant or that the delicate operation of loading the hypergolic compounds of a liquid fueled rocket have been accomplished. Because of the highly intricate nature of the weapon one must realize that at any one time short of an actual readiness alert some missiles will be undergoing routine check-out, maintenance, or repair and will thus not be immediately available for service. The comments regarding the difficulty in fuelling rockets utilizing liquid propellants illustrate the trend to use of solid fuel in the "second generation" missiles such as Minuteman and Polaris. The initial problem with solid fuels was the difficulty in casting the grain. Burning rates in solid fuels are controlled by grain shape. A crack or other imperfection will change the burnable surface of the grain and thus upset the burning rate. Adequate casting procedures have now been developed.

[12]The question of the relative ascendancy of either the offense or the defense in modern warfare is a highly complex one and is complicated by the tremendous increase in destructive force available to both sides, but primarily to the offensive. When thermonuclear weapons are employed in an attack, whether the defense possesses a ten or ninety percent kill probability tends to lose significance, which was not the case with conventional high-explosive weapons. Excellent analyses of this question are to be found in Foreign Policy Studies, loc. cit., and Brodie, Strategy, pp. 147-222.

defenses depend upon political adroitness and the determinant represented by the "delicate balance of terror."

Other advantages attend the employment of the ballistic missile. As mentioned above, it may be maintained in high readiness and does not require the ministrations of an air crew to bring it to life. Depending upon specific arrangements of launching sites and considerations of tactical employment the entire missile striking force of a nation could be launched simultaneously, thereby accruing maximum utilization of warning time and maximum application of force upon the target.

Missiles and their launching facilities are more simply hidden than the extensive base facilities required for manned aircraft.[13] Once installed at launching sites, extensive pre-attack preparations such as marshalling, predeployment, alerts and other revealing activities are not required to the extent that would be the case with manned aircraft or more conventional armaments. This of course maintains the integrity of preparations for a surprise attack.[14] Because missile base facilities are less extensive in area requirements than most other arms, hardening[15] of these bases is somewhat simpler.

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[13] Unfortunately the same advantages do not pertain to the extensive activities attending the construction of a missile launching site. Consequently the question of just how "hidden" a launching site would be in a free society such as the United States (or for that matter in a closed society such as the USSR which might, however, be vulnerable to aerial or satellite reconnaissance) is debatable. For a discussion of the relationship of aerial reconnaissance by the U-2, Russian missile site construction, and the United States security policy, see Rees, op. cit., pp. 72-85.

[14] Which also naturally makes them a weapon much more suitable to a nation which employs a "strike first" strategy.

[15] Hardening is a term applied to construction practices designed to make a structure more resistant to blast or other damages. This may take the form of reinforced concrete, recessing into the ground, a combination of both, or some other method. See Posture Briefings, pp. 1200-1202.

The physical configuration of the missile and its launch characteristics render it susceptible to a certain degree of mobility, independent of complex launching sites. It is not essential that missile firing sites be geographically fixed.[16] Missile advocates contend that they are a much cheaper weapon than manned aircraft.[17] It is also stated that missiles, in adequate numbers and proper emplacement, provide the nearest approach to an invulnerable deterrent.

Disadvantages

While merits of the ICBM's are impressive, they are not without drawbacks. Limitations of missiles are of both a strategic and a technical nature. While research and experience may obviate some of the technical drawbacks, overcoming of strategic disadvantages is perhaps more difficult as they most

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[16] Thus the current interest in the submarine launched Polaris and the possibility of a railroad train mounted Minuteman. Ibid., pp. 634-35 ff. relative to Polaris, and pp. 1085-86 ff., relative to Minuteman.

[17] The cost of a missile or an aircraft is a highly speculative item depending upon whether the production line price of a particular unit under a specific contract is taken as the point of reference, or whether the cost of research and development is also computed. Published figures, particularly in the press, seldom give their source nor the basis of calculation, and consequently must be regarded critically. Missiles do not require the costly training of an air crew, but the total cost for skilled maintenance technicians is probably as high or higher on an overall basis for missiles than for aircraft. Because of the highly doubtful basis of cost comparisons for the generalized type of review contained in this paragraph they will not be further alluded to in comparing the advantages of missiles and aircraft in this chapter. For general interest, estimated costs are: Minuteman (in silo) $3 million; Atlas and Titan $14-17 million; Ibid., pp. 126, 139. The first B-58 cost $25 million, the latest $11 million. Current B-52 cost is $0.7 million. It will be noted that President Eisenhower described the early B-58 as worth more than its weight in gold. Senate Military Procurement Authorization Hearings, 1962, pp. 371-72.

frequently are as contingent upon circumstances as they are upon the weapon itself. The first and greatest drawback of the missile is its lack of flexibility. It is primarily a "go or no go" instrument.[18] It has little value in a limited war situation and its use commits the antagonists to an all-out war. Once a missile is launched it cannot be recalled.[19] It is a one-way weapon and offers no possibility for re-use in a second strike effort. It is certainly not an air superiority weapon in the sense that the term is applied to manned aircraft.[20] Missile bases may act as "lightning rods" for enemy missile attack. Presuming that the first priority target in an aggressor's attack will be his victim's striking power, the more numerous the sites of that power the heavier will be the initial blow and the greater the over-all devastation.[21] It might also be noted that the hardening of missile sites

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[18] The term is an outgrowth, now become popular, of the jargon of the weapon technician. It has apparently arisen from what was commonly the designation of the red and green lights on the consoles of test equipment which indicated the operational status of particular system components or the over-all weapon status.

[19] The inflexibility of the missile probably represents the heart of the missile-aircraft controversy and the point most heavily attacked by the manned aircraft advocates. General LeMay gave a very terse summation of these views in his statement that "Your finger is either on the button and you are at war, or it is off the button and you are at peace." See U. S. Congress, Senate, Department of Defense Appropriations for 1962, hearings before the Subcommittee of the Committee on Appropriations, United States Senate, 87th Cong., 1st Sess., on H.R. 7051, p. 1544. (Hereafter referred to as Senate Defense Appropriations Hearings, 1962.) Such a view, however, fails to take into account the changing strategic circumstances which arise when a certain degree of invulnerability of the missile force is attained. In this regard see Kissinger, Necessity, pp. 27-51.

[20] An air superiority weapon is one designed to guarantee ones own control of the air in a specific location while at the same time denying its use to the enemy.

[21] Which partially accounts for the great popularity of the Polaris system. Congressional interest in the location of missile sites may be seen in Senate Military Procurement Authorization Hearings, 1962, pp. 339-[illegible].

generates the requirement for larger yield warheads to eradicate them.[22]

The complexity of missiles generally requires that they be pre-targeted, and changing targets on short notice can be a difficult task. This is of course further complicated if the exact location of the enemy targets is not known. In extension of this point, one might note that the missile has practically no capacity for seeking out "targets of opportunity," nor can a missile report back the results of its attack.

Finally, there have been discussions as to the static nature of a missile arsenal. Missile sites are immobile or at least withdrawn from the forward area, and preferably well hidden. They cannot be utilized for a show of force or to stiffen the courage of a threatened ally. The psychological impact of the variable and contradictory demands of missile utilization upon its crew is not yet fully understood. There is some belief that complete reliance upon missiles might breed what has come to be known as a "Maginot Line" philosophy.[23]

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[22] An interesting study which delves into the mathematical and statistical aspects of missile accuracy, target hardening, warhead size and other pertinent aspects may be found in Robert D. Powers', Fundamental Equations of Force Survival," Air University Quarterly Review, X (Spring, 1958), pp. 88-92. Using the formulas developed in this work, another author has evolved the startling conclusion that an enemy would require 16,000 ICBM's (at a cost of $500 billion) to overcome even a "modest" retaliatory capability on the part of this country. While this type of conclusion no doubt represents an accurate calculation based upon the formulas it is of course necessary to evaluate very carefully the integrity of the basic figures with which the formulas were entered. Nonetheless the second article is valuable in that it sheds some light on a little discussed and important aspect of deterrent philosophy. See Clay Blair, Jr., "Pilots Aren't Obsolete Yet," The Saturday Evening Post, CCXXXII (April 23, 1960), 31 ff.

[23] Senate Military Procurement Authorization Hearings, 1962, p. 3[illegible]; and, Posture Briefings, p. 1095.

But the greatest disadvantage of complete reliance upon missiles, from the strategic viewpoint, is the commitment to all-out war which they represent. The challenge they are meant to answer may not be the one which the enemy elects to throw down.

The foremost technical detraction of the missile is its lack of reliability. Missiles, despite the large amounts of money and vast effort expended in their development and perfection are relatively new and untried systems. They are amazingly complex and can be rendered impotent by even the most minor system failure.[24] Whether liquid or solid propellant, the fuel is critically sensitive to numerous influences and must be handled with extreme diligence.

An extension of the reliability problem is that of accuracy. Most authorities agree that a missile will not presently attain the accuracy of a bomb launched from a manned aircraft. Further complication of the accuracy factor arises from the inexact knowledge of location of some targets on the earth's surface. There is the further limitation of warhead size. At the present time it is not possible to arm a ballistic missile with a warhead equal

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[24]Specific details of missile construction are classified for obvious reasons. It is possible, however, to gain some small appreciation of the complexity of these weapons by reviewing some of their more obvious characteristics. Any missile is composed of four basic sections; the air-frame, the propulsive section, the guidance or control section, and the warhead section. Various systems include electrical, mechanical, pneumatic, hydraulic, fuel, and a multitude of others, possibly including radio, radar, and operational self-testing. These systems may further be subdivided into a maze of electronic circuitry, piping, compressors, gyros, valves, turbines, relays and so on literally through a catalogue of known technical devices. In the face of such complexity it is not difficult to appreciate what a truly wonderful feat the successful firing of a missile represents. Even a person with such an obvious interest in and responsibility for missiles as the Secretary of the Air Force has stated "Their reliability has not been proved out with the degree of thoroughness that has been necessary in the past with other types of ordnance." See House Defense Appropriation Hearings, 1962, Pt. 3, "Secretary of Defense, Chairman, Joint Chiefs of Staff, Service Secretaries and Chiefs of Staff," p. 397.

in destructive power to that which can be carried in a conventional aircraft, nor of course does a missile carry more than one warhead. This latter limitation does not apply to the larger aircraft.

As missiles approach the point where they become a significant component of the nation's deterrent force, observers have noted with some concern that a nuclear warhead has never been tested in an actual long range missile shot--that is, that there is no proof that a nuclear warhead will survive the rigors of launch and flight. Finally, critics ask whether or not there are sufficient number of these devices in existence and in operational configuration to guarantee the safety of the nation in perilous times.[25]

III. THE CASE FOR MANNED AIRCRAFT

Despite the missile's disadvantages noted above it is possible that the next few years may mark the demise of the manned aircraft as a first line deterrent weapon, particularly in the realm of intercontinental warfare. Advocates of the manned aircraft do not accept this prediction without strenuous objection.[26] It is possible they maintain, particularly in view of the indefinite formulation of the future presently discernible, that manned aircraft will always have a place in the scheme of deterrence. The ratio of aircraft to missiles, however, they generally concede, will probably change in favor of the missile.

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[25] Because of the highly controversial B-70 question, and the related question of the continued purchase of B-52's, which figured so prominently in the discussions of the defense budget, comparisons of the merits of missiles and manned aircraft occur in practically all of the congressional hearings. Perhaps the most comprehensive and concise summary of the entire question appears in the testimony of Major General John K. Rester, Deputy Director of Operations, USAF, in Posture Briefings, pp. 1154-58.

[26] Ibid. Elaboration of all of the points mentioned in this section may be found in the citation above. There is also an excellent resume of the various Air Force missile systems.

Advantages

The principal merit of the manned aircraft is in direct contrast to the principal disadvantage of the missile. The aircraft possesses not only a large degree of strategic flexibility but a near infinite tactical flexibility in comparison to the ICBM.

Manned aircraft may be launched and directed to their assigned targets at the first indication of possible attack. But once launched they remain under the control of their command agency and may be recalled in the event that the attack indicators prove erroneous--a capability significantly absent in missiles. The initial launch can be made on the authority of a local subordinate commander because it is not an irredeemable act. The ability to have a significant portion of the retaliatory force in the air and relatively immune to attack relieves a modicum of the psychological pressure on the individual in whose hands rests the final decision to commit the nation to war. If missiles are the only retaliatory system available the decision maker has at best fifteen minutes to get them off the ground or risk their destruction.

While from an engineering standpoint the necessity of maintaining an aircrew in a manned aircraft may be considered something of a penalty, that same crew represents certain particular capabilities that science has not yet been able to duplicate in practical fashion. Despite advances in the field of cybernetics, science and industry have not yet matched the overall potential of the human being, particularly in the function of judgment. Consequently the presence of the crew suggests practical advantages covering a wide variety of categories which do not accrue to the complex but essentially limited missile. The ability of the crew to perform an evaluated reconnaissance and battle assessment permits obtaining information important to further conduct of the

air-battle and subsequent activity. The crew can also seek out a target whose location is not precisely known and therefore a poor missile target. The ability of the crew to recognize the fact that a target has already sustained adequate damage permits them to divert from that target and engage an alternate objective. This suggests a certain tactical economy of weapons which in certain circumstances could be of great importance. It is also possible for the crew to identify and engage targets of opportunity.

Large bomber aircraft are capable of carrying a payload greatly in excess of the capability of missiles. Not only may larger weapons be carried, but it is possible to vary the composition of the load to a rather high degree. Through this capacity for variety it is possible to "tailor" the load to a particular target or series of targets. (One might note that such a process is another form of the problem of weapon selection, although on a considerably different level than has been considered herein.) Thus it may be seen that the aircraft might be a more practical and more economic means for attacking both very hard and very soft targets. The fact that aircraft dropped bombs are generally more accurate than missiles is of course a factor which relates directly to the foregoing considerations besides being an independently important advantage.

Manned aircraft advocates point out that they are a tried and proven weapon, and that strategic and tactical doctrines have been devised and tested. These known characteristics facilitate a higher degree of certainty in military planning.

There is a further argument for manned aircraft which in effect seeks to overcome the relative disadvantages of both systems by combining the advantages. Independent of missiles, aircraft pose a difficult problem to the

defense. In conjunction with the missile they complicate the defensive problem in an almost exponential fashion. A coordinated missile and aircraft attack offers a high degree of tactical flexibility. The tactical flexibility is further increased, and the greatest disadvantage of the missile is overcome, if the missile and the aircraft are mated in what is known as a "standoff" weapon. Current planning envisages air launched ballistic missiles which will require the aircraft to approach no closer than 1,000 miles to the target.[27]

A final advantage of manned aircraft lies in the realm of economics. Advances in commercial aviation are usually dependent upon research undertaken to fulfill military requirements. In this way the taxpayer receives a remote but important return on his investment in manned aircraft, aside from whatever security value such aircraft may provide. This latter of course would be somewhat complicated to compute in terms of dollars and cents.

Disadvantages

Viewed strictly as a means of weapon delivery manned aircraft can be said to suffer from what in another context was their most significant advantage. From an engineering standpoint the necessity to carry a crew of human beings imposes severe limitations on the performance of the machine. The aircraft and its crew are not expendable components of the weapon system. The necessity for a round trip journey requires that the portion of total weight

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[27] Thus the very significant interest in the "Hound Dog" and "Skybolt" projects. The former is an air-breathing supersonic missile of "over" 500 mile range which is presently in production. The latter is a rocket powered ballistic missile with a range of 1,000 miles. A B-52 can carry two Hound Dogs or four Skybolts. See House Defense Appropriations Hearings, 1962, Pt. 5, "Secretary of Defense, Chairman, Joint Chiefs of Staff, Service Secretaries and Chiefs of Staff," pp. 12, 51 ff.

allotted to fuel be double that required simply for delivery of the payload. Further weight must be sacrificed to provide environmental and defensive accommodation for the crew. Performance characteristics of the vehicle must be restricted to the narrow stress limits of the frail human physiology. None of these restrictions are imposed upon the ballistic missile, nor in a more limited sense, on the air-breathing guided missile. Consequently the price of human intelligence in the vehicle is a rather stringent limitation in the operational parameters of that vehicle.

Proceeding from the engineering standpoint to the strategic and tactical there are again formidable disadvantages inherent in manned aircraft. The foremost of these is its susceptibility to enemy defenses. Compared to an ICBM warhead, the manned aircraft is a wonderfully large and slow radar target. The defense has adopted a new generation of weapons, anti-aircraft missiles, and has thereby achieved a capability for causing attrition rates out of all proportion to those known in World War II. The manned aircraft's capability for penetration[28] of defenses cannot compare with that of the missile, a weapon against which a defense has yet to be achieved. Aircraft

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[28]The problem of penetration and effectiveness of air defenses is a highly technical one. The layman may find less difficulty in understanding the basic problem if he approaches it from the standpoint of "saturation" of the defensive system. Under any given set of conditions a defensive system has the capability of processing a specific number of targets per unit of time. (In a modern, automated system such as SAGE this may be remarkably high.) When the number of targets exceeds the processing capability of the system "saturation" is achieved and bombers begin to get through to their objective. Thus it is conceivable that a horde of the most obsolete, low speed aircraft might overwhelm the most advanced defensive system, although such an effort would be inhibited by its tactical impracticality. Another approach is to degrade the defensive system, that is, to lower the saturation point. Increasing the speed of the attacking aircraft will accomplish this if their deployment is such as to take advantage of the lowered saturation point. Thus it may be seen that increasing either the numbers or

are more vulnerable instruments both in the air and on the ground. Protecting a bomber from atomic attack is made more difficult not only by the physical lineaments of the bomber in comparison to the missile, but also by the much more extensive base complex which must remain above ground required for aircraft operation. Detractors of manned aircraft also point out the high cost of training the air crew and maintenance of the aircraft. The necessity for tankers further compounds this cost, and to a certain extent, reduces tactical flexibility.

Inherent characteristics of aircraft and aircraft operations usually require extensive preparations for a large scale attack. These preparations are difficult to keep secret and the possibility always exists that the activity may be detected by the enemy. The speed of aircraft operation also allows considerable warning time to the enemy. Consequently, manned aircraft do not lend themselves to surprise attack as the term is understood in regard to missiles.

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capabilities of the attacker may degrade the defensive system. But the attack must be planned in such a manner as to exploit this degradation. Degradation may also be achieved by jamming, use of decoys, disrupting communications, or any number of tactical innovations. Increasing or decreasing the altitude of the attacking force could cause a degradation even without a change in speed or numbers if the selected altitudes are marginal to the operational parameters of the defensive system. Even a slight rearrangement of a formation may exploit the saturation point where the same number of aircraft in a different disposition might not. Factors pertinent to the defensive system itself such as operator fatigue, rate of fire, communications efficiency, and data processing capability all affect the saturation point. All efforts at penetration and the utilization of penetration aids are in effect an attempt to overwhelm at the weakest point. (The low altitude attack is a special case, but the theory still holds.) If the layman thinks of the weakest point in air defense as the point of lowest saturation level and then equates a particular characteristic or capability of an attacker as a means of lowering the saturation level he will then be in a position to evaluate the claims of penetration ability made for the attacker.

In a retaliatory attack aircraft would be limited by their launching cycle.[29] In the unlikely event that all aircraft on a base were instantly ready for launching, there is still a lengthy time lapse between launch of successive aircraft from the base. In an era when fifteen minutes warning is the best that can be expected this can be a severe limitation.

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[29] In evaluating the claims that certain aircraft may be capable of taking off within a certain very limited amount of time one must remember that while an aircraft may be ready to take off, it does not necessarily follow that there is a runway available for it to do so. Claims safety requirement generally require about one minute between successive launches of large jet bombers. See testimony of General Curtis E. LeMay, USAF, Senate Satellite and Missile Inquiry, Pt. 2, pp. 1090-91.

CHAPTER V

EVOLUTION AND CHARACTERISTICS OF A WEAPON SYSTEM - - - THE B-70

Through the preceding chapters of this thesis the reader was acquainted with problems collateral to the selection of the weapons upon which the nation's security is in part based. Various categories of decisions and the factors pertaining which these categories represent have been delineated. The merits and disadvantages of the two primary means for the delivery of deterrent power, the missile and the manned aircraft, have been compared. Thus has been presented the background against which the decision maker must operate.

The discussion must now narrow to a specific weapon in order that decisions on specific issues may be examined against the background provided. The weapon system to be described is the B-70 "Valkyrie" manned bomber. The decisions to be reviewed concern the position that this weapon system shall be allotted in the nation's deterrent force.

The problem of decision posed by the B-70 is notably appropriate to and indicative of the immediate stage of the country's political, military, and technological circumstances. The 1960's represent an era of major significance for the United States. At a time when the country is only beginning to acquaint itself to the mantle of world leadership which has rested uncomfortably upon it for a mere decade and a half it also finds itself bereft of that peculiar invulnerability which for so long permitted an unusual flexibility of maneuver on the international scene. At a time when the advances of science proffer seemingly unlimited possibilities for good and evil and the potentialities

inherent in changing social patterns portend equally major and unforeseeable possibilities, the nation's leaders are faced with a choice between reliance on new and untried but spectacular weapons of the future and the ultimate maximization of an older but more proven weapon.

The relationship of the types of decisions posed by world problems in general and the selection of weapons in particular is perhaps not too direct a one. But there is at least a symbolic relationship. And in that symbolism may be found a reflection of the variety, complexity, and magnitude of the decisions to be made. The symbolism at least serves to point up the importance of proper decision.

I. THE B-70

Illustrative of the rapid advances of technology and the complexity which they introduce into the decision making process is the fact that a present day decision must be made concerning a weapon which does not yet exist. No B-70 bomber has yet left a production line, much less been tested in actual flight.[1] Yet such are the requirements for early decision in the face of long lead times and rapid obsolescence that the decision maker is confronted with the problem of allocating remarkable moneys and resting the security of the nation upon the undemonstrated predictions of scientists and engineers. This is but one of the problems of decision making in the

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[1] First flight date is scheduled for December, 1962, under the program envisaged by the Kennedy administration's 1962 budget revision. This will be of a prototype vehicle only, not the complete weapon system. See Senate Military Procurement Authorization Hearings, 1962, p. 355.

present stage of technological revolution.[2]

Inasmuch as the actual mechanism itself cannot be examined in a material sense, we must be content with examining the premises and predictions of the engineers who have conceived and are building this weapon. Just what is the B-70 and what are the capabilities it offers in return for the immense sums of money it demands of the decision maker?

The "Quantum Jump"

The B-70 represents not just a highly developed aircraft, but rather a "quantum jump in the science of aeronautics."[3] As one writer has put it

> The B-70 is a high-speed, high-performance vehicle which is so far advanced beyond today's aircraft that to call it an airplane is to downgrade it semantically as well as technologically. It is, rather, a manned missile.[4]

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[2] In this regard note a statement by General Maxwell D. Taylor, Major Defense Matters, p. 192:

> The decisions we are taking this year, this year's budget, for example, will control the pattern and the capabilities of our forces 2, 3, or 4 years into the future.
> In a sense, it mortgages the future.

[3] Senate Military Procurement Authorization Hearings, 1968. p. 378.

[4] Ed Rees, The Manned Missile, p. vii. Inasmuch as this work has been already cited occasionally and will be cited more frequently in this chapter a word about its nature may be appropriate. The work, written in a rather sensational journalese style cannot be described as a scholarly effort. Citation of authority or source is rare. Authoritative persons with an intimate knowledge of the B-70 program have been questioned in regard to the accuracy of the information presented, and none has disputed its essential correctness. The author is a senior military correspondent for Time magazine and presumption of adequate experience and reliable sources would seem to be justified. Apart from a lack of source material and documentation, the most severe criticism which might be aimed at Rees' work is a tendency to favor the most extreme claims for B-70 capabilities.

Justification of such claims requires the investigation of many of the technical and operational aspects of the B-70. Full understanding also requires a review of the evolution from concept to present state. While this is not a technical paper the technical aspects mentioned must be reviewed as part of the specific background of decisions to be examined and also for their illustrative value relative to the decision making process.

The performance characteristics of the aircraft are a significant measure of its uniqueness and its potential as a deterrent weapon. More significant than the bare recital of the figures, however, is the magnitude of the technological advances which the achievement of these performance figures represents and the possibilities which those advances portend for the future. As one advocate of the aircraft has stated, "the B-70 will not be just a follow-on bomber, but will be a major advancement in the development of strategic systems."[5]

Performance

Were it necessary to isolate the most significant feature of this machine it would probably be the fact that its success will mark the conquest of the thermal or "heat barrier," an attainment no less, and possibly more, notable than the breaking of the "sonic barrier" which presaged the already amazing speeds of jet aircraft.[6]

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[5] Testimony of Major General John A. Hector, USAF. Posture Hearings, p. 1156.

[6] The so called "heat barrier" does not have a precise scientific definition inasmuch as it is really a semantic generalization. Practically speaking it is simply a speed range for an aircraft at which skin friction

When completed the B-70 will fly faster and higher than any other operational military or commercial aircraft.[7] Its maximum range will not be markedly greater than or even as great as some of today's longer-ranged planes, but even equalling the range of its slower predecessors is an engineering feat of the first magnitude as subsequent discussion will indicate. The B-70 will fly at a sustained speed of Mach 3, or approximately 2,000 nautical miles per hour[8] and conduct its routine operations at an altitude "in excess" of 70,000 feet. With these operational parameters

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causes various materials to lose strength or possibly even melt. Structural failure would probably precede actual melting, however. It may be seen that the heat barrier would vary for different materials. The sonic barrier is more accurately defined as the "transonic barrier." Woodford Agee Heflin (ed.), The United States Air Force Dictionary, p. 534, defines it as

> A so called barrier to flight encountered by an airplane designed for subsonic speeds when it reaches transonic speeds and meets the turbulence incident to diverse degrees of compressibility.

[7] In any discussion of speed and altitude capabilities the remarkable feats of such aircraft as the X-15 and the U-2 come to mind. It should be noted that the X-15 is solely a research vehicle and the U-2 a single purpose machine in which all considerations were sacrificed to the attainment of altitude. Neither of these aircraft would be considered an operational military aircraft in the sense that the term is customarily employed.

[8] Ibid., p. 311. The term "Mach" is a measurement of speed, named after an Austrian scientist, Ernst Mach, which uses a number to relate the speed of an object to the speed of sound in air. Thus an aircraft flying at Mach .5 would be flying at one half the speed of sound, while one flying at Mach 1 would be flying at the speed of sound, Mach 2 at twice the speed of sound and so on. The speed of sound is generally given as 741 mph in dry air, sea level pressure, at 32° F. Because as the speed of sound varies with temperature and air density the actual speed in miles per hour whereat an aircraft reaches the speed of sound (and compressibility) also varies with these conditions. Consequently the term Mach has come into use as a more meaningful and more convenient form of measurement.

the X-70 is not only an extremely high performance aircraft but more significantly an aircraft which approaches the upper limits of the useful atmosphere and in so doing perhaps opens another avenue into space as an alternative to the expensive and relatively limited rocket approach.[9]

While it would be a relatively simple matter to list the more important characteristics of the X-70 in a straightforward columnar or tabular presentation followed by a chronological listing of the important events in its development a fuller appreciation of the implications of these characteristics will be possible if the characteristics are presented as they evolved in response to a combination of military requirements and technical advances. In this way also will the relationship of strategic considerations and the decision making process be preserved.

II. EVOLUTION WITHIN LIMITATIONS

Improvements in mechanical devices generally tend to proceed along an ascending scale of refinement; the closer a device approaches perfection the more minute and sophisticated are the refinements. Eventually an upper limit of performance is reached at which point refinements usually are in the nature of convenience and utility, rather than in any significant increase in operational performance. Within the performance range of any device which has reached its upper limits of capability a particular

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[9] Performance data listed are taken from the X-70 Report. This report is the most authoritative reference on the subject of the X-70 uncovered in the course of research. The report and the testimony contained in the various Congressional hearings are the only primary sources of an unclassified nature available. No other work or article on the X-70 program encountered presented any broader scope of information, and most bore unmistakable indication of having been based upon this document.

demand for an increase in one particular aspect of performance is achieved only at the sacrifice of another. Resolution of conflicting demands for and adjustment of the various aspects of performance requires compromise, and compromise is the inherent characteristic of almost any engineered device or system. Attainable capabilities are generally today described as the limitations imposed by "the state of the art." Improvements in the state of the art usually require some radical technological breakthrough or a complete change in the direction of the approach to the problem. Most frequently it is a combination of the two.

Propeller Bombers

The foregoing generalizations apply in a very high degree to aircraft and may be seen reflected particularly in the history of bomber development in the air force. From the doughty B-17 "Flying Fortress" of World War II fame on up through the now familiar B series, the 29, 36, 50, followed by the jet generation 47 and 52, there were continuous improvements in performance reflecting improvements in technique and advances in the state of the art. Speaking very generally, in the propeller type aircraft improvements in speed and altitude were nominal, being sacrificed to range and load carrying capacity.[10] The last of the propeller powered bombers, the B-36, in many respects represented the storming of the then extant performance limitations by something of a "brute-force" approach. Given the existing limitations, the only approach possible to extension of the range of a bomber was to build it bigger in order to carry more fuel.

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[10] Ibid., pp. 23-29.

This is what happened in the B-36--and it was big. In range it was the first of the truly intercontinental bombers.[11] But in speed and altitude its advantages over its predecessors were not remarkable.

Jet Bombers

Development of the jet engine made possible notable advances in speed and altitude. But jet engines are fuel hungry devices and the first of the long range jet bombers (the B-47) to enter the SAC inventory could not even claim half the range of the B-36 which they supplanted. But again this is an example of the compromises necessary in the military sense no less than in the engineering. The great advances in speed and altitude capability were worth the lessening in range and attendant reliance upon overseas bases or tankers for refueling.[12] The obvious next step in the development of bombers was to build one with the equivalent or better speed and altitude performance of the B-47 but with extended range. And, given the limitations of existing technology, the logical approach was an increase in size. Thus

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[11] Rees, op. cit., pp. 89-91, attributes a 10,000 mile range to the B-36. John W. R. Taylor (ed.), Jane's All The World's Aircraft, 1950-1951, p. 220c, substantiates this figure. (The latter work, an annual, more commonly referred to as Jane's Aircraft, is generally regarded as the most authoritative and complete compilation of international aircraft statistics.) Berlin, op. cit., p. 973, defines an "intercontinental bomber" as one ". . . capable of flight from one continent to targets on another without landing either in going out or return." Obviously such a definition lacks specificity if one is interested in an absolute mileage reference. The definition further breaks down in its applicability to specific aircraft when the citation goes on to note that such a bomber may be refueled in flight. Simple reference to a chart or globe will suggest that range capability for an intercontinental bomber should logically fall somewhere between six and seven thousand miles insofar as United States forces are concerned.

[12] B-70 Report, loc. cit.

did the B-52 enter into development.[13] Not only did the B-52 provide an increased range, but also a slight increase in speed and ceiling such as might be expected from the continued refinements resulting from technological progress.

While the B-52 gave the strategic air command the range it required in an intercontinental bomber it was still a sub-sonic vehicle. Before either the B-47 or B-52 flew, it was realized that continued advances in aeronautical science would permit the development of defensive fighter aircraft capable of supersonic speeds and that such a development would place the new bombers at a disadvantage in the accomplishment of their mission. Consequently, even before the first B-47's became operational, studies were undertaken looking forward to the development of a supersonic bomber.[14]

In this endeavor the state of the art demanded that the engineer's game of compromise be played to the hilt. Studies indicated that the fuel consumption for sustained supersonic flight would result in ranges as much as 70 per cent less than might be obtained in an aircraft operating in the subsonic region.[15] This is unacceptable to the military air tactician, hence the tactician was required to join with the engineer in developing a compromise, and it was from this need for compromise that the "split-mission" concept arose.[16] Simply stated, the split mission concept envisages an aircraft conducting the greater part of its flight to the target at relatively economical subsonic speeds, making a supersonic "dash" through the enemy defensive area to the objective, and then to withdraw at such a speed as the remaining fuel supply might permit.

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[13] Ibid., p. 3. [14] B-52 Report, p. 3. [15] X-70 Report, loc. cit. [16] Ibid.

The first aircraft to incorporate this strange philosophy was the B-58, which in SAC's geneology is the replacement for the B-47. B-58 development was abetted by the formulation of the "transonic area rule,"[17] an example of the continual refinements in science and technology applied to aircraft development. The B-58 gave SAC supersonic[18] capability over the target, but it suffered from the same drawback as did the craft it replaced--short legs.[19] Probably nothing illustrates as well the severe restrictions and compromises imposed by the limitations of the state of the art as this short cycle repitition of history which the B-47 - B-58 series embodies.

While the B-58 perhaps represented the best that the industry could produce at that time it was still too much of a compromise and the need

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[17] This is the rule which gave rise to the now familiar "coke-bottle" shape of the fuselages of many supersonic aircraft. This is a method of reducing aerodynamic drag by variation of the aircraft's longitudinal cross section. See B-58 Report, p. 17.

[18] The terms subsonic and supersonic when used in reference to aircraft simply refer to vehicles which operate below or above the speed of sound. At one time the term transonic enjoyed some common military usage in describing an aircraft that could attain the speed of sound but did not normally operate at such speeds except upon severe operational demands. The term is more properly limited, however, to more technical purposes. Another term, hypersonic, is coming more and more into popular usage and this refers to speeds in excess of Mach 5.

[19] Range of the B-47 is under 5,000 miles. See Chart 12, The B-70 Report, p. 25. Specifics as to the range of the B-58 are classified. The cited chart indicates a range of less than 2,000 miles, but the entry is for a speed of Mach 2, a velocity which a "split-mission" aircraft would not be expected to maintain during an entire mission. An informative discussion of the capabilities and drawbacks of the B-58 and comparison to other bombers may be found in Senate Military Procurement Authorization Hearings, 1962, pp. 371-76.

persisted for a truly intercontinental bomber capable of supersonic speed. Such a weapon, an aircraft to meet the requirements of the 1965-1975 era, would be the logical successor to the B-52.[20]

III. EVOLUTION OF THE B-70

Just as basic studies leading to the development of the B-52 began as early as 1946, three years before the B-47 became operational in the Air Force, efforts to find a replacement for the B-52 began at about the same time that the first B-47's arrived at their operating bases.[21] It will be noted that at this time, 1951, the Strategic Air Command was just finishing the initial work on the B-52 and even a prototype of that aircraft had not been constructed. Planes in the development pipeline promised to make up for the deficiencies of the B-47. The B-58 would give SAC supersonic speed and the B-52 would give it range. But so far it was impossible to build both the speed and range into one airplane.

Formalization of the Requirement

By 1954 SAC planners had formalized their requirements to the point where a GOR (General Operational Requirement) could be promulgated and on October 14 GOR No. 38 was published by Headquarters, SAC.[22] This requirement called for a replacement for the B-52 in the 1965-1975 time period.

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[20] B-70 Report, p. 3. [21] Ibid.

[22] Ibid., pp. 3, 47. Current Air Force usage has replaced the term General Operational Requirement with Specific Operational Requirement. See AFR 375-1, p. 2.

At least two years of study preceded the issuance of the GOR, which was titled "General Operational Requirement for an Intercontinental Strategic Weapon System Piloted Bomber."

With the issuance of the GOR, it became the responsibility of the Air Research and Development Command (ARDC) to undertake necessary action to transform the requirement from a statement of need into a working project aimed at the satisfaction of that need with a piece of operational military hardware. The first step in this process was the issuance of a Study Requirement (SR), in this case, SR No. 22.

SR No. 22 spelled out in greater detail the objectives of the program which it set into action. It identified the project as "Weapon System 110A". With regard to the specific aircraft which would result it listed a speed of Mach .9 for cruise and a "maximum possible" supersonic dash speed during a 1,000 nautical mile penetration to the target. A target date of 1963 was established for the first wing of 30 operational aircraft. Penetration capability and radius of action were stated to be of greater importance than high speed. GOR No. 30 was superseded by GOR No. 32 on March 22, 1955 and a revised SR followed on April 15 which stated that the cruise speed should not be less than Mach .9 "unless a significant increase in maximum radius of action or in combat zone" could be obtained.[23]

Successive steps in the prosecution of Weapon System 110A were the establishment of a Weapon System Project Office on April 4, 1955 and a directive on June 21st of the same year by the Air Force Deputy Chief of Staff

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[23] D-70 Report, p. 47.

for development then development to initiated "as soon as possible."[24]

At about the same time that [illegible] approved [illegible] another section of the Air Force Headquarters was working on a project which was separate in scope but had need of an aircraft of essentially similar operational characteristics of the already established bombardment system. This project found definition in [illegible] 36 for an intercontinental reconnaissance system. The ARDC, on July 1, 1955 issued [illegible] 56 which called for a reconnaissance version of the B-70 and designated the project as [illegible] 1104. The two requirements were combined and the resultant project designated as [illegible] 1104/L.[25]

Shortly thereafter, on July 13, 1955, the Air Force selected six contractors whose capabilities were estimated to be such as to allow them to undertake so extensive a project. Of the six selected, only two, North American Aviation and Boeing Airplane Co., elected to respond to the Air Force's announcement. The bids submitted were qualification bids, not design bids. These were simply devices to prove to the Air Force that the companies had the necessary facilities to undertake the work. After review of the qualification bids the Air Force issued competitive phase I contracts to both companies on November 8, 1955. This is where was the Air Force telling both companies to go ahead and see who could come up with the best design. In the months since adjustments, representing a series of decisions the import of which can only be estimated were made, which then

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[24] Ibid. A discussion of weapon system concepting may be found on p. 37. A more elaborate discussion is contained in B-70 report, pp. 19-40. See also Boeing Proposal Study, Pt. 1, pp. 99-116.

[25] B-70 report, pp. 47-48.

being an amendment which delayed the target date for the first wing of B-70's from 1963 to July, 1964. Boeing and North American submitted preliminary design proposals in April, 1956. At about the same time ARDC was directed to hold work on the development of the 110L reconnaissance system in abeyance.[26] The reconnaissance requirement was never revised.[27]

The period between the submission of bids in April and the fall of 1956 was spent in review of the bids and investigation of contractors' facilities. On October 18, 1956 a significant and probably very reluctant decision was made to terminate phase 1 development of Weapon System 110A. This decision resulted from Air Force disappointment with the results of the design studies. This disappointment stemmed primarily from the approach taken by the manufacturers.

Initial Proposals

In light of the stage of technical advancement of the aircraft industry at that time, these manufacturers had of necessity to resort to the same methods that had long characterized the search for increased range in bombers; to increase the size. Considering the amount of power and consequently fuel required to push the desired bomber to high altitude and to the very edge of the sonic barrier, the resultant proposals did indeed envisage aerial monsters. To increase the fuel capacity, at least one of the proposals

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[26] Ibid., p. 48.

[27] It is possible to speculate upon a relationship between this cancellation and the U-2 program, which was beginning to show promise at that time. Rees, op. cit., pp. 71-84, relates in interesting although undocumented detail the story of the U-2 and also its relation to military and national policy.

utilized disposable fuel tanks. One such tank (to be mounted on each wing-tip) consisted of a tank supported by a "floating" wing panel, which weighed 191,000 pounds and was roughly the size of a B-47. The total weight of the proposed assemblage approached 750,000 pounds, half again as much as a B-52. Predicted top speed for the aircraft after disposal of these tanks was Mach 2.3. For these and other reasons the proposals were not accepted and the designs were returned to the contractors for further study.[28]

This "redirection" was tantamount to a cancellation of the program and further development by the contractors consisted of continuation of studies on a limited research and development basis. Suggestions were made to the manufacturers to investigate the use of high-energy fuel and boundary layer control principles in an effort to increase the range.[29]

The contractors studied the problem for six months. These six months represented a significant period in the field of aerodynamics. The studies undertaken by the aeronautical engineers resulted in conclusions of great significance in the field. The conclusions appear to have been based upon the utilization of both known and predicted technology, more or less a re-arrangement of engineering principles.

The sum total of the effort was the conclusion by both companies, apparently independent of one another, that foreseeable developments would permit the building of an all-supersonic vehicle. The venerious split-mission concept could be abandoned. And as a bonus, range could even be extended. On the surface, such a conclusion represented a virtual contradiction of the previously held tenets of aeronautical engineering.[30]

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[28] L-70 Report, p. 4. [29] Ibid., p. 18. [30] Ibid., pp. 4, 18.

Successful Proposals

Reports of these prospective break-throughs were submitted to the Air Force on July 1, 1957. Two months later, on August 30th, the Air Force initiated a 45-day competitive design period to be followed by a five day on-site inspection of contractors' facilities. North American's inspection began on October 25th, and Boeing's a week later, on November 4th.

The B-70 Report is very informative of the manner in which the results of the inspections were evaluated and gives valuable insight into at least one phase of the decision making process. A pertinent section is quoted:

> On November 27, 1957, the team captains representing the three commands reported their findings in a formal briefing to the three commanders of the ARDC, SAC, and MAD at Wright Air Force Base. Recommendations from the three commanders were then submitted separately in sealed envelopes to the Secretary of the Air Council.
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> On December 15, 1957, the three team captains made their report to the Air Council. General Boling presided over the meeting. Utilizing a scoring system which had been worked out in considerable detail some weeks before the actual onsite evaluation, each of the command teams reached the conclusion independent of one another that the North American Proposal was superior by a substantial margin. General Irvine stated before the Air Council that the Weapon System 110A source selection exercise had been the most thorough and most effective competition ever conducted by the Air Force.[31]

This action was followed by the announcement on December 23, 1957 by Headquarters, USAF, that North American had been selected as the Weapon System 110A contractor and had been awarded a phase I contract. Action was also taken to accelerate the program so as to provide the first operational wing for SAC as early as possible. Investigation indicated that at 18 months

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[31] Ibid., p. 49

acceleration of the schedule was possible, and on January 4th, 1958 recommendation was made that North American be given responsibility for the procurement of the entire weapon system. As a result the status of North American as the prime contractor for the entire weapon system (except for the engines) was officially established. The B-70 was again in business.

With North American established as a prime contractor, and General Electric (for the engines) as an associate contractor, development of the bombing-navigation was assigned to the International Business Machines Corporation as a sub-contractor to North American in early summer of 1958.[32] From this point on, for a period of approximately a year and a half the development of the B-70 proceeded smoothly. "Smoothly" in this case does not necessarily apply to the scientific and industrial processes involved, for the problems in those fields demanding resolution were numerous. But the work proceeded apace, funding was adequate and complications extraneous to the technical aspects did not impede themselves. Major milestones during this period were a Development Engineering Inspection (DEI) which took place March 2-11, 1959 and a Mockup review over the period March 30-April 4, 1959.[33]

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[32] Ibid.

[33] Ibid., p. 50. The citation lists the objectives of the DEI allowing Air Force personnel to: 1) review contractor's interpretation and compliance with contract specifications; 2) determine accomplishment of objectives with respect to design performance; and, 3) review all aspects of maintenance and inspection functions, safety, ease of operation, and producibility. The mockup inspection on the other hand, in for the purpose of examination of "operational characteristics and suitability of the configuration and the general arrangement of the operational article . . .", in other words, can the pilot see out of the window. It is of interest to note that these inspections eventuated in a total of 611 requests for changes in the B-70--each of course requiring a significant number of decisions before final disposition of the request.

On December 3, 1959 the B-70 program received a blow from which it has never really recovered. On that date the Air Force announced that the B-70 project was cancelled as a Weapons System program and that action was to be taken toward the development of a single prototype vehicle. Thus arose the first of many decisions which were to lead to a prolonged and sometimes heated controversy centering around results of the decision making process.[34]

But before this controversy is examined in detail, it is appropriate to examine the results of the efforts outlined above through a description of the evolved weapon.

IV. CHARACTERISTICS OF THE B-70

Configurations and Operational Parameters

The airplane which had taken final shape in the mockup presented for review in late March of 1959 was as different from previous designs in external appearance as it was in operational capabilities. The design eventually fixed upon was a delta-winged canard[35] whose total weight and size was roughly similar to the existing B-52. The delta wing permitted

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[34] Ibid., pp. 41-44, 51.

[35] The term "canard" denotes an aircraft with those elements usually known as the "tail surfaces" located in the forward part of the aircraft. In the B-70 only the horizontal stabilizer is mounted in a forward position. The delta wing, twin rudders, and engines are mounted in the after position of the B-70. A discussion of the technical reasons for this configuration may be found in the B-70 Report, pp. 7-8. Aside from technical advantages it is significant to note that this arrangement contributes to the low landing and take-off speeds which permit the B-70, despite its high operational speed, to operate from existing ground facilities.

a narrower airplane, although the B-70 is "somewhat" longer and about 10 percent heavier than the B-52.[36] The six jet engines which comprise the power plant are located in a special housing six abreast aboard the centerline of the aircraft. This mounting arrangement marks a significant departure from traditional American aircraft industry practice, which heretofore has tended to prefer outboard engine mountings on wing pylons. The engine housing system is integral with a special form of intake ducting systems which represent one of the significant aerodynamic advances contributing to the overall performance of the B-70. The specific arrangements required to effect efficient airflow to the engines are of sufficient extent to be classified as a major subsystem, the Air Induction Subsystem. Other major sub-systems inherent in the airframe itself are the Secondary Power sub-system[37] and Environmental Control sub-system.[38] Military sub-systems are

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[36] Ibid., pp. 6, 8. Along with other technical advantages, the centerline arrangement of the engines renders the aircraft less susceptible to the aerodynamic difficulties resulting from loss of one engine than are multi-engined jet aircraft with engines in outboard mountings.

[37] Ibid., pp. 8-9, 15. Secondary-power refers to that energy required in the operation of the aircraft other than that utilized in propulsion. Electrical and hydraulic are the more common forms of secondary power. In the B-70, each engine is accompanied by an auxiliary power package which "provide the equivalent horsepower of a modern V-8 engine in one-third the volume and two-thirds the weight" and are also so constructed as to provide necessary reliability in a "500° F. environment." Tate, op. cit., p. 31 states that all six engines of the B-70 may be started simultaneously through use of a turbine-powered "alert pod." Using this device the B-70 is basically independent of ground facilities and Tate claims it can be airborne in three minutes "from a dead start." The B-70 Report, p. 15 mentions the alert pod but does not engage in specifics.

[38] Ibid., 9-10, 29-30. The B-70 is confronted with the normal problems of providing pressure and temperature accommodation for crew and equipment such as are found in any modern high performance aircraft. The speed regime in which the aircraft operates, however, presents new problems of considerable magnitude. At Mach 3 an aircraft is heated to 650° F. Dissipation of the heat thus generated becomes a major problem. The cited

divided into the Bombing and Navigation, Defensive, and Mission and Traffic Control.[39] All of these systems are part and parcel of the engineering complexity required to produce an aircraft capable of flying at "about" 2,000 nautical miles per hour at altitudes "in excess" of 70,000 feet, and to a range "in excess" of 6,700 miles.[40]

Technological and Industrial Implications

Incomplete justice would be rendered to this notable aircraft if

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work and Rees, op. cit., pp. 24-27 present interesting descriptions of the solution of this problem through transpiration air-conditioning of the interior and use of fuel as a "heat sink" for cooling the exterior. The result of these practices is to provide a "shirt-sleeve" environment within the B-70 in which the four crew members are unencumbered by the hitherto normal paraphernalia of pressure suit and oxygen mask.

[39] B-70 Report, pp. 10-12. The bombing and navigation system is the heart of the manned aircraft's ability to seek out targets and to attain superior accuracy. The navigation system utilizes inertial navigation devices and automatic star-tracking in conjunction with a pre-programmed computer which in effect automatically guides the aircraft to the target. One authority has stated

> ". . . this is the finest step forward that I have seen. Despite the fact that the airplane flys many times faster and much higher, through the automation of the system the bombardier will have as much time, and more, to perform his bombing and navigation functions as in the current airplanes."

(General Hester, quoted in Posture Briefings, p. 1160.) The system also has a planned capability for ballistic missile launch.

Discussions of the Defensive subsystem found in the citations make no mention of defensive armament. Apparently defense activities will consist primarily of electronic countermeasure activities intended to jam or confuse enemy efforts. The B-70 Report, p. 22 makes mention of the future possibility of employing air launched ballistic missiles against enemy defense installations.

The Mission and Traffic Control subsystem encompasses those communication, identification, landing aid, and navigational (other than those in the bombing navigation subsystem) facilities necessary for routine operation of an aircraft.

[40] Ibid., passim.

only its military capabilities were examined. Of equal significance are the ramifications of these capabilities as they impinge upon the aeronautical sciences and the aeronautical industry. As was mentioned earlier, the most significant technological manifestation is the advent of an aircraft that will not only conquer the heat barrier but will fly continuously at a supersonic speed. The two accomplishments are inter-related. The escape from the limiting compromises which demanded reciprocal sacrifices in the range, speed, altitude, and payload relationships represents a scientific breakthrough--the indication of technical feasibility. This breakthrough would have been little but an equation on paper without an accompanying breakthrough in industrial techniques in aircraft construction which would provide the material out of which an aircraft could be constructed capable of withstanding the temperatures generated by operation in the speed range contemplated.[41] While this dual achievement is perhaps

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[41] Ibid., pp. 23-35 discusses in some detail the technical aspects of this accomplishment and its relationship to present and future aeronautical industrial technology. In highly simplified terms, the scientific breakthrough represented by the B-70 consisted of the theoretical demonstration that it was possible, through utilization of known and recently discovered aeronautical principles, to maximize the physical configuration of an aircraft for all-supersonic flight, and to accomplish this without undue sacrifices in range. Perhaps the most important of the scientific principles employed in the B-70 is that of compression lift, which is in essence the design of the plane in such a manner that the wing is in coincidence with the shock-wave it creates in supersonic flight, in effect, riding on it. This has been compared to the effect of a surf board being propelled by a wave.

Implementation of these scientific principles was impossible until a means could be devised to construct an aircraft which could endure the heat generated at the speeds which these scientific discoveries made possible. Aluminum rapidly loses strength at temperatures in excess of 250° F. The solution to the material problem was found in the use of "steel honeycomb sandwich" panelling techniques. The industrial difficulties which had to be overcome, and the overcoming of which won North American Aviation the American Society for Metals' 1959 Medal for Advancement of Research is described very interestingly in Ibid., op. cit., pp. 22-24, 111-15.

the most spectacular of all the developments, it is equally symbolic of the many lesser but equally important developments which were required to support and implement the major breakthroughs.

North American Aircraft, Inc., it will be remembered, had been designated not only as the airframe contractor, but also as the complete weapon system contractor. In effect this meant that North American was the prime contractor and by extension the Air Force agent for the development of all of the systems and subsystems that went to make up the aircraft. (For specific reasons, the engines were omitted from this arrangement.) Major subcontracts had been awarded by North American to thirteen companies, which in turn had let second-tier sub-contracts to at least 23 other companies. In all it has been estimated that nearly 10,000 companies were involved in the overall B-70 program.[42]

Military and Civilian Potential

The general advantages of the manned aircraft were compared to missiles in Chapter IV. Those that pertain particularly to the B-70 will be mentioned briefly to provide a quick review and to point out how certain particular advantages are enhanced by the capabilities of the B-70.[43] The 30-foot long bomb bay will accommodate a variety of conventional or nuclear weapons. The ability of the crew of the manned bomber to sight directly upon the target enhances the accuracy of attack by such a system as opposed to the ballistic missiles. The nature of the manned bomber lends it to dispersal and air-borne alert measures. Besides air alert the B-70 has a

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[42] B-70 Report, pp. 38-41. [43] Ibid., passim.

"built in" capability for a two minute ground alert. The combination of both of these capabilities is further enhanced by its reliability. The combination of speed and the unique features of the defensive system, while not equalling the penetration capability of a missile, increases it in relation to previous manned systems. Ability to fly at altitudes from near zero to 80,000 feet allow it to exploit to the maximum natural weaknesses in an enemy defensive radar screen. It has been estimated that the construction of a defensive network capable of handling the threat of the B-70 or similar manned aircraft would require the expenditure of about $40 billion by Russia.[44] Aside from speed and altitude capability of the B-70, present and future countermeasure capabilities are expected to enhance its penetration capability. Finally, from a military standpoint the B-70 can provide a physical demonstration of its prowess by an actual show of force and it can also engage in extensive reconnaissance[45] and surveillance activities.

In a technological sense, the B-70, as the first aircraft to offer a means of conquering the heat barrier presages the advent of an entirely new generation of manned aircraft. A major design point has been attained,

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[44] Ibid., p. 24-25. This point is frequently made by B-70 advocates in testimony before Congress. Seldom if ever is the question raised as to whether or not this is a good thing, an indication perhaps, that some of the subtler nuances of the philosophy of deterrence are not always given appropriate consideration. The citation does indicate concern for the possibility of Russian possession of a similar aircraft.

[45] In the main this thesis has not concerned itself with the possible qualifications of advantages and disadvantages of the various weapons systems examined, as such concern is more appropriate to a completely technical paper. The reader might well note, however, that most claims must be regarded as rather relative, and absolute statements as to capabilities of any system are dangerous. In this regard, pertinent to the passage above,

and growth possibilities are yet to be exploited. The more optimistic B-70 advocates speak of a Mach 4 or 5 potential.[46] The configuration of the aircraft lends itself particularly well to use as a test vehicle for atomic power when such is proven feasible for manned aircraft utilization. Design parameters have been restricted in certain aspects so that the B-70 will be compatible with existing ground facilities. By a simple extension, such capabilities suggest the further development of the vehicle as the basis for a new supersonic passenger and cargo transport.[47]

One of the more spectacular recommendations for utilization of the B-70 in other than its role as a bomber is as a "recoverable booster" in

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even such an outspoken B-70 advocate as General White, then Chief of Staff of the Air Force, said in regard to reconnaissance capability

> I think that the business of a Mach 3 bomber picking up an unknown target or a moving target is not one of the best arguments for a bomber, but it unquestionably is one.
>
> I think that the speeds and the altitude at which it will serve are such that while it is an argument, I would consider it, from where I sit, as a minor one.

New Major Defense Matters, p. 123.

[46] Posture Briefings, p. 1175.

[47] B-70 Report, pp. 30-31. That the B-70 opens the door to the technological feasibility of a 2,000 mile per hour transport apparently is not seriously contested. The practical implications of such a commercial vehicle are not without the need for further investigation, however. One of these implications might be the eventual progression of a series of ear and china shattering supersonic "booms" following each flight of a supersonic transport. For further discussion of the problems of supersonic flight see U. S. Congress, Senate, NASA Scientific and Technical Problems, Hearings before the Committee on Aeronautical and Space Sciences, United States Senate, 86th Cong., 1st Sess., pp. 405-19.

the space program.[48] In such a mission the B-70 would be assigned the duty of carrying rocket vehicles to the upper edge of the atmosphere and launching them, thereby obviating the need for the high-powered and expensive boosters currently used (and expended) in such missions now.

This thesis has been an outline of the characteristics, history, and capabilities of the B-70 supersonic bomber, one of the weapons contending for a role in the nation's deterrent arsenal. To this point we have examined the relationships of weapons and strategy, weapons and the decision making process, and the characteristics of a specific weapon. This has provided the background against which a series of decisions are to be reviewed. It now remains to describe and examine these decisions.

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[48] B-70 Report, pp. 36-38. For a more extended discussion see William A. Coughlin, "B-70 Proposed as 'Booster'," Missiles and Rockets, VII, August 29, 1960, p. 15 f.

CHAPTER VI

THE B-70 AND DECISION

Development of the B-70 thus far outlined represents either explicitly or implicitly the resolution through a series of decisions the numerous factors contingent to the process of weapons selection. These considerations ranged from aspects of grand national strategy to precise technical problems. Decisions which threatened the existence of the weapon were in its early stages the result of doubt as to its technical feasibility though not, apparently, as to military desirability. But as the concept of the B-70 more and more approached reality a decision was made which terminated its development as a weapon system and substituted a more modest program of development of an airframe prototype only.

This decision gave rise to a lengthy controversy which leads to the ultimate purpose of this study--an analysis of the decisions made by the Kennedy administration regarding the B-70 program as reflected in the 1962 budget. The first step in the process of examining these decisions is to review briefly the history of the B-70 from the decisions reflected in the December, 1959 order to the advent of the new administration in January, 1961.

I. SETTING THE STAGE--DECISIONS OF THE EISENHOWER ADMINISTRATION

Decisions of the last year of the Eisenhower administration are of importance as they serve to establish the background against which decisions were made by the present administration. In which they serve to set the

stage of the controversy. An awareness of the decisions is important for an understanding of the controversy.

B-70 Program Status Prior to December, 1959

The program under which B-70 development was proceeding prior to the mid-back of December, 1959, postulated an initial requirement for 62 aircraft. Of these, 50 were to be assigned to the first B-70 wing and 12 would be utilized for the purpose of operational evaluation.[1] Subsequent to completion of these operational evaluations, 11 of the first 12 would be returned to the factory for "retrofit" which would make them identical to the operational model. The initial flight of the first B-70, under the existing plan, would have taken place in January, 1962, and the first wing of B-70's would have become operational in August, 1965. Had this program been carried to completion the total projected cost would have been $5.3 billion. Actual expenditures prior to the cancellation, or "redirection," of this program amounted to approximately $360 million.[2]

An indication of where this $360 million was spent (without a single plane being produced) is partially revealed by a few figures. The prototype engines had been developed and subjected to over 100 hours of test-stand operation. Wind tunnel testing had amounted to about 1,250 hours. The bombing-navigation subsystem had consumed 195,000 engineering man-hours, the propulsion system 695,000, and the system contractor (North American) had expended about 6 million engineering man-hours.[3] To the above may be added the undesignated but certainly not insignificant amount of time and

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[1] B-70 Report, p. 12. [2] Ibid., p. 1. [3] Ibid., p. 12.

energy which had been expended by the thousands of other sub-contractors whose efforts are not catalogued in these figures. While the foregoing represents only minor fragments of the efforts involved, the reader may at least gain a small insight into the complex nature and comparable expense of contemporary weapons systems.

The Effects of the December, 1959 Redirection

Air Force orders to North American Aviation directed it to "recast" the weapon system program to a prototype program. This resulted in the cancellation of the bombing-navigation system and all other military subsystems. What in effect remained was a demonstration vehicle, but a vehicle which retained the basic configuration. " . . . the XB-70 is therefore a true aerodynamic prototype of a strategic bombing weapon system." But the "aerodynamic prototype" is not a military prototype. If and when a decision were made to once again redirect the program to a complete weapon system, the important subsystems would have fallen behind the airframe in development. The money could be made available to reinstitute development of these systems, but the time lost is not recoverable.[4]

The redirection order was accompanied by a cut in funds available. Congress had approved a $315.6 million program for fiscal year 1960. Of this amount only $150 million was budgeted for that period. The Air Force had requested $456 million for the program in fiscal year 1961. The administration budget reaching Congress contained only [illegible] million for the B-70 program. Congress indicated its feelings on the B-70 program by taking

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[4]Ibid., pp. 43-44.

"available" an additional $290 million in the fiscal year 1961 defense appropriation bill.[5] But it should be noted that while Congress can appropriate money, it cannot force the administration to spend it.

The fact that 1960 was an election year may have some bearing on the question of the B-70 program and other defense department projects. It will be remembered that in that year, as in many of the preceding, the government was characterized by a Republican administration and a Democratic Congress. With an eye on the forthcoming election, the Democratic majority in Congress could be expected to make political capital of any administration program, and defense programs tend to have a strong popular appeal. Whether or not Congressional attacks upon the defense program or recommendations for changes thereto were or are motivated by political partisanship or a sincere concern for national welfare is an evaluation beyond the scope of this paper. Perhaps the simplest escape from the question would be a presumption that a practicing politician would not be particularly distraught if he could combine an attack motivated by the greatest sincerity and highest purpose with an opportunity to embarrass the opposition party.[6]

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[5] Ibid.

[6] An interesting observation on the effects of shifting political fortunes may be made by noting that the B-70 Report which strongly advocated the continuation of the development of the B-70 as a complete weapon system basis was prefaced by a letter of submittal over the signature of the Chairman of the Preparedness Investigating Subcommittee, one Lyndon B. Johnson, now Vice-President in the Democratic administration which is also recommending only prototype development. See p. iii. Also see p. 44 for a complete list of the subcommittee's recommendations. In fairness to the members of Congress it should also be noted that advocacy of the B-70 program did not necessarily follow party lines. For instance, see excerpts of Senator Goldwater's remarks on page 2. During the discussion under the Kennedy administration certain Democratic members of Congress were no less active in support of the program.

Whatever the relationship between motivations of national security and political opportunism, it is notable that Congressional advocacy of the B-70 program continued throughout 1960. National defense in the era of the cold war is obviously a natural center for political controversy, and all the more so in an election year. Predictably it loomed large in the electioneering of 1960. Defense questions figured prominently in the speeches of the Democratic candidate.[7]

Whether or not moved by election considerations, the administration in October, 1960 released the money which Congress had previously appropriated for manned bombers.[8] The then Senator Kennedy immediately described this action as a "transparent political maneuver."[9]

Despite the tides of political warfare that engulf the nation each election year the administrative processes attendant upon the development of the annual budget continue. In the preparation of the fiscal year 1962 budget, the B-70 enjoyed a resurgence. Apparently the Eisenhower decision to release the money which Congress had appropriated breathed new life into the program. The Air Force asked for $566 million to continue the program on the basis of development of a complete weapon system. The administration responded by including in the budget an item for $55½ million, which would still have allowed the development of a weapon system prototype. Differences in the Air Force and administration programs would have apparently resulted

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[7] E. g., see speech of Senator Kennedy to the American Legion convention in Miami, Fla., reported in The New York Times, October 19, 1960.

[8] Ibid., November 1, 1960.

[9] See editorial, "The Resurrection of Valkyrie," The Nation, (CXCI, November 19, 1960) p. 13.

to a differing time schedule for development, but would not differ basically in the development of a complete weapon system. With the presentation of the Eisenhower administration budget in January, development of the B-70 program was at least tentatively returned to a full weapon system status.[10]

II. DECISION ON THE "BOMB MISSION"

By a curious quirk of the American political system, the budget for the maintenance of a new administration is prepared by its predecessor. If an election returns an administration to power, this is not a significant difficulty. In the case of a change in the political party in control of the administration, such as occurred in January, 1961, difficulties can arise. Nature and numbers of difficulties are of course dependent upon a variety of considerations, most of which suggest themselves.

The President's Directive

The new Chief Executive advised the Congress and the country that he had directed his Secretary of Defense to

> reappraise our entire defense strategy--our ability to fulfill our commitments--the effectiveness, vulnerability, and dispersal of our strategic bases, forces, and warning systems--the efficiency and economy of our operation and organization--the elimination of obsolete bases and installations--and the adequacy, modernization, and mobility of our present conventional and nuclear forces and weapons systems in the light of present and future dangers. I have asked for preliminary conclusions by the end of February--and I shall then recommend whatever legislative, budgetary, or executive action is needed in the light of those conclusions.[11]

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[10] Senate Military Procurement Authorization Hearings, 1961, p. 185.

[11] State of the Union Address, 1961, pp. 5-7.

The results of this review were not such as to fill the many ardent B-70 advocates with unalloyed ecstasy. Despite the charges and counter-charges of the election campaign, the new administration in which did the same thing to the B-70 program that the Democratic administration had done in December of 1959--"redirected" the B-70 program to the status of an aerodynamic prototype. The resurrection of the B-70 as a complete weapon system had been a short-lived translation. It now becomes our task to examine this particular decision which threatens to return the B-70 program once again from a strategic weapon development to the single development of a high performance aircraft.

The Secretary's Decision

In response to the directive of his Chief Executive, the Secretary of Defense had made the ordered review and produced a decision on the B-70. That decision was not to proceed with the development of a weapon system at the present time. But it is important to note that the decision was a qualified one, and was not presented as final and irrevocable. It was definitely put forth as what can best be described as a bid for time, an attempt to prolong the necessity of making an ultimate decision on the basis of presently ascertainable facts. Perhaps the testimony of the Secretary best outlines the nature of the decision.

> The substantial increase in the total number of strategic weapons, projected in our recommendations, calls for a reexamination of the role of the B-70 Mach 3 manned bomber. The January budget provides funds to continue the development of this aircraft as a complete weapon system, but even then it would not become available in operational numbers until 1968. Well before that time, we expect to have a large number of intercontinental ballistic missiles fully tested and in place, as well as a still substantial manned bomber force equipped with air to ground missiles.

The B-70 was originally conceived in 1959 as an ultimate replacement for the B-52. At that time, the important place the intercontinental ballistic missile would have in our strategic arsenal could not be fully foreseen. To meet the expected increase in enemy air defense capabilities, the B-70 at that time was designed a performance objective of Mach 3.0 at 70,000 feet. An aircraft capable of flying at that speed and altitude requires many technically complex subsystems for bombing and navigation, environmental control, automatic flight control, air traffic control, and defense. With the advent of the ICBM, the B-70 also requires a quick ground reaction time, thus introducing the need for additional equipment. The net result is an extremely complex and costly aircraft.

The program reflected in the January budget would have carried through the development of the B-70 as a full weapon system at an estimated total cost of $2.7 billion. A production program of about 200 aircraft is estimated to cost at least $4½ billion additional. Through fiscal year 1961 a total of about $600 million has been allocated to the B-70. The January budget included $350 million for 1962.

The principal advantage of the B-70, in an era when both sides have large forces of ICBM's, is its ability, in common with all manned bombers, to operate under positive control and to deliver a large number of nuclear weapons in a single sortie. In the light of the increasing capabilities of ground-to-air missiles, the speed and altitude of the B-70, in itself, would no longer be a very significant advantage. Furthermore, it has not been designed for the use of air-to-surface missiles such as SKYBOLT or HOUNDDOG, and in a low altitude attack, it must fly at subsonic speeds. In addition, the B-70 would be more vulnerable on the ground than hardened missiles and it does not lend itself to airborne alert measures.

Yet, there are still some uncertainties with respect to the operational characteristics of our missile force. We also recognize that there will continue to be important advantages inherent in a mixed missile and bomber force. Furthermore, from a purely technical point of view, the B-70 development affords an opportunity to explore the many diverse problems involved in flying a large aircraft at great speed and at high altitudes.

After weighing all of the advantages and disadvantages, we have concluded that the B-70 should not, at this time, be carried forward as a full-scale weapon system development. Instead, we recommend that it be pursued as a development program designed to demonstrate the technical feasibility of the aircraft structure and configuration, as well as certain major subsystems required in a high speed, high altitude environment. This approach, at the cost of

> one year's delay but with a saving of $1[illegible] million in 1[illegible], would still preserve the option of developing a manned bomber if we should later determine such a system is required. While, on this new basis, the project would cost $1.2 billion before it is completed, it still is $1.[illegible] billion less than the cost of carrying to completion the plan proposed by the previous administration. Meanwhile, we plan to explore the possibility of developing other manned systems better adapted to the operational environment in which both sides have large ICBM forces.[12]

The Secretary's testimony concerning the factors operative in the decision is particularly enlightening in its revelation of the considerations operative in the decision making process relative to weapon selection. It also provides an excellent example of the interaction of the various categories of decisions. An examination of the major points demonstrates this interaction. The decision in its entirety would most probably fit into the category which has previously been termed as adaptive or a review decision. It is also heavily justified by financial aspects, and thus might also be considered a financial or budgetary decision. A recapitulation of the main points of the decision will prove helpful.

The first paragraph of the statement makes note of the increasing number of strategic weapon systems becoming available and indicates that this requires a "reexamination of the role of the B-70." This would seem to indicate that the "mix" was possibly in danger of becoming too "rich," i. e., that the number of systems contained therein was in excess of the actual needs of the country as determined by the international strategic

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[12] Senate Military Procurement Authorization Hearings, 1962, pp. 11-12. The testimony of the Secretary of Defense before the House Appropriations Subcommittee was substantially the same as before the Senate and may be found in House Defense Appropriations Hearings, 1962, Pt. 3, "Secretary of Defense, Chairman, Joint Chiefs of Staff, Service Secretaries and Chiefs of Staff," pp. 12-14.

situation, the composition of the armed forces, and national and military objectives. Stated another way, it is possible that the country was in the position of buying more deterrence than it needed.

There is the indication that the period of availability of the B-70 in operational numbers, 1968, influenced the decision. This of course brings about a consideration of both technical and strategic relationships. The desirability of the B-70 system in the 1960-and-beyond time period must be equated against the possible advances in missile and other systems in that era. There is the possibility that even with its remarkable capabilities, the B-70 might be obsolete in comparison with projected systems of that era, or even before it became operational. The Secretary in fact states "In light of the increasing capabilities of ground-to-air missiles, the speed and altitude of the B-70, in itself, would no longer be a very significant advantage." This is of course a projection of probabilities and possibilities, not of absolute certainties. But it is the type of projection which a decision maker must utilize.

The explanation of the decision, it should be noted, does not degrade the requirement for manned bombers in the mix. It does however point out that in 1968, when the B-70 would become operational, the country will have an adequate number of manned bombers plus a large number of ballistic missiles "fully tested and in place."

It is interesting to note that Mr. McNamara chose to mention that the B-70 was originally conceived in 1955, before the importance of the ICBM had been confirmed. He thus extends recognition to the necessity of readjusting decisions to changes in technical and strategic relationships. The lack of a capability to carry air-launched ballistic missiles is

stressed, as is also the questionable value of the aircraft in low-level attacks. Finally, in the technical field the possibility is held out that there may be other manned systems "better adapted to an operational environment in which both sides have large ICBM forces."

An equally weighty factor in the decision, besides technical and strategic implications, is the economic factor. The Secretary pointed out that the program contemplated in the January Eisenhower budget would eventually total out to an estimated cost of $2.7 billion. If the plane were entered into production in a program for 200 aircraft, another 4.5 billion would be required. He also noted that 800 million had already been spent on the program. The fact that a manned aircraft would require extensive ground installations to maintain it in an alert status was also noted as a high cost factor.

The drawbacks which the Secretary cited are more or less common to all manned aircraft. In light of these disadvantages it was decided that the B-70 program should not be followed as a complete weapon system development "at this time." But it must be noted that the B-70 program was by no means abandoned. The decision was characterized by some very strong reservations. "Uncertainties with respect to the operational characteristics of our missile force" were admitted, and the "important advantages inherent in a mixed missile and bomber force" were recognized. The value of an aircraft capable of experimenting in the high-speed and high-altitude regimes of the B-70 received note. From the testimony of the Secretary it is obvious that the balance of factors entering into consideration of the decision was not absolutely decisive, at least insofar as complete abandonment of the B-70 was concerned.

The decision was really a decision to postpone final decision. It represented what is probably a very necessary though frequently criticized type of action on the part of responsible officials. The Defense Department appeared to be buying time. In many cases wherein both sides of a particular question seem to be equally balanced, or nearly so, it is impossible to justify a decision which represents a very high degree of finality. Such cases are too susceptible to the vagaries of varying circumstances, and a situation which was only finely balanced in the direction of a pro decision might conceivably be reoriented strongly in the opposite direction by a sudden variation in external circumstances. In such cases the best decision is often a decision not to decide. This might be described as indecision. It might also be the better part of wisdom.

But a "wait and see" decision can entail penalties. The postponement of a decision is usually not without cost. Future events may prove that the moment of postponement was really a moment demanding immediate and incisive action. But decision makers are probably no more gifted with clairvoyance than other humans, and they must be governed by immediate circumstances. And in immediate circumstances costs, short of disaster, can sometimes be roughly calculated. In the explanation of the decision relative to the M-70 the Secretary of Defense gave an indication of the probable foreseeable cost should the decision eventually prove to be the wrong one. The most obvious cost of delaying decision is time. Time gained for further analysis must be paid for by time lost in bringing the eventual product into the Air Force inventory if such action should ever be required--in this case a cost of one year. But there also is the question of the increase in ultimate costs resulting from the delay should the present decision be reversed.

these are immediately incalculable, but certainly significant. Probable future costs were however balanced by immediate gains. In the present year (fiscal 1962) adoption of the Skybolt program proposal would result in the immediate saving of $198 million. If there is no further change in the program, eventual cost of the prototype program will be $1.2 billion, which is less by $1.4 billion than the program originally proposed. Of course eventual reinstitution of the full weapon system program would require the $1.4 billion and probably more, but for the interim, the administration had purchased in effect an option to save $1.4 billion.[13] Whether or not this will eventually prove to be an overly expensive option can only be determined by future events.

Thus the new administration had decided to take a cautious approach to the B-70 question. They apparently were not convinced that the B-70 had a claim to a role in the deterrent force sufficiently valid to justify continuation of full scale development. Conversely they were no less convinced that the coming years might show the claim to be indeed a valid one. It would seem that there might be a definite tendency towards the belief that missiles complemented by existing manned bombers would provide an adequate deterrent force through the mid and late 1960's.[14] The belief appears to have been strong enough to risk at least a year's delay in development of the B-70, but not strong enough to write it off completely on the basis of presently available information. Consequently, the use of a wording phrase

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[13] Probably no point in the Secretary's testimony was more tailored by members of the Congress than was this item. See Ibid., pp. 125-26, and Senate Military Procurement Authorization Hearings, 1962, pp. [illegible], [illegible]. Also see Senate Defense Appropriations Hearings, 1962, pp. [illegible].

[14] Senate Military Procurement Authorization Hearings, 1962, pp. 9-75.

the bet was "hedged" by retaining the program at a reduced development pace. In the meantime the possibilities of developing a system "better adapted" to the expected environment are to be explored.

III. THE PROCESS OF DECISION

The instructions which the new President presented to his new Secretary of Defense provide the analyst with a fortuitous opportunity to examine the processes of decision in the government, particularly inasmuch as that Secretary took particular pains to spell out to the Congress (and by extension, to the people) just how he went about executing the assigned task.

It will be remembered that the President had stated that he had directed the Secretary to "reappraise our entire defense strategy." In testimony before the Congressional committees the Secretary prefaced his remarks with an outline of the manner in which he and his subordinates undertook to discharge this assignment. This outline allows a significant insight into the manner of execution of the decision making process under the direction of Mr. McNamara. Significant excerpts from these remarks are quoted for their illustrative value. (Emphasis in all cases is not in the original and is supplied to highlight significant steps or factors in the decision making process.)

> The proposed changes to the January defense program and budget are based on a preliminary <u>reappraisal</u> of our defense posture . . . We did not attempt to review every item in the budget . . . Such a comprehensive review must await a complete reappraisal of our basic national <u>security policies, plans</u> and <u>programs</u> . . . .
>
> We believe this is a reasonable approach to the problem. Our predecessors did a very thorough job in preparing their

fiscal year 1962 proposals. We clearly differ with their conclusions in several important areas and in these areas we have recommended a number of major revisions. Where we do not now have a sound and sufficient basis for change, we recommend that the January budget requests be permitted to stand. . . .

The changes in the defense program proposed by the President are the product of a cooperative effort on the part of all agencies of the executive branch concerned with national security. Within the Department of Defense itself, we have employed, in addition to the regular staff machinery, a number of special task groups to look into particular aspects of the program. Each of these task groups operated under the direction of a senior official and included representatives of the military services, the Joint Staff, and all other elements of the Department having an interest in that particular study. Throughout the course of the task groups' work, the service Secretaries and Chiefs were kept informed. As the studies were completed, I personally reviewed the results in detail with the service Secretaries and the Joint Chiefs of Staff in order to have the benefit of their advice and counsel.

The final changes recommended by President Kennedy do not provide everything that everyone would like to have. Based on your own long experience in defense matters, I think you would agree that such unanimity is seldom, if ever, achieved. But I do believe it is fair to say that the President's recommendations reflect [sic] a consensus of the principal military and civilian officials of the Department of Defense. No doubt there is room for differences among reasonable men as to what constitutes the optimum combination of programs for the Nation's defense. All I can say is that we have carefully examined all of the principal alternatives and have selected that combination of programs which we believe will give the Nation a fully adequate defense at the least cost, in the light of the threat as we view it today.[15]

An Analysis

Although the quoted material and the emphasized portions thereof may not reflect all of the possible aspects or categories of decision

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[15] Ibid., pp. 2-3.

making, they do cover a wide range and give a valuable appreciation of how the decision making process was carried out in a specific instance. They illustrate both the method of achieving a decision and the considerations pertinent.

The entire action is described as a reappraisal. The necessity of taking into account basic national policies and existing plans and programs is noted. An attempt to determine a basis for change, or the revision of previous decisions is inferred as a partial objective of the reappraisal. It is obvious that the project was a joint effort requiring a "cooperative effort" involving among other organizational units regular staff machinery, special task groups, and representatives of all the services. The Secretary personally reviewed all of the recommendations with his responsible subordinates, and he also states that he sought the benefit of their advice and counsel. He also admits that the resulting decisions do not provide everything that everyone would like, which is another way of saying that the decisions are a compromise, as probably must be all solutions to important and complex problems. The method of reaching the compromise was by obtaining a consensus of military and civilian opinion.

Here perhaps is the heart and core of both the decision making problem and process-the optimizing of alternate sides of a question. The remark that there is "room for differences among reasonable men" possibly isolates with great precision the real difficulty in resolving a complex problem. The differences of opinion can be compared to the classical horns of a dilemma, but in most actual problems the location of the horns can never be determined with exact certainty. The problem seems to be the selection of a course in an instance in which there is no clear indication

of absolute certainty as to the right and wrong directions. The decision should result in the accrual of the greatest possible number of advantages with the least possible number of disadvantages. And considering the variables in this and other possible circumstances one may adduce a striking implication of the difficult role of the decision maker--and also some appreciation of the burden of responsibility.

The foregoing might aptly serve as a textbook case reference for the decision making process. Yet there really seems to be nothing in the description of an abstract or esoteric nature. Though such factors may underly the very basic description, psychological and sociological aspects do not seem to intrude too obviously. (Nor is it probable that these aspects would be readily discernible from such a presentation.) Still, it would seem from the foregoing example that the decision making process as followed by the Secretary of Defense is hardly any more or any less than that which might be outlined by any rational individual who devoted a modicum of thought to the subject. This is not to infer that there is anything deficient in the process just outlined, but rather that perhaps the decision making process is not such a remote and complicated problem as might be expected.

Decision and the Mix

Appropriate to the subject of weapons selection is even further testimony by Mr. McNamara. While this is not particularly revelatory in the process or technique of decision making, it is informative as to the method of analyzing the problem of determining the "mix," and approaches the problem in more detail than did the generalized statement quoted above.

With regard to the subject of strengthening and protecting our strategic deterrent the Secretary noted the tremendous increase in complexity which the advent of the ICBM had added to the problem of insuring survival of the retaliatory force. He then stated

> . . . the problem of preventing the destruction of our forces on the ground becomes much more difficult. Essentially, there are two major approaches available to us: (1) develop forces which can be launched within the expected period of tactical warning; (2) develop forces which can ride out a massive ICBM attack.
>
> The feasibility of the first approach is heavily dependent on timely and unambiguous warning. While we can be reasonably sure of timely warning, we cannot in the present state of the art be wholly sure of unambiguous warning. In the case of the manned bomber, this uncertainty presents some serious, but not necessarily critical problems. The bomber can be launched under positive control and then ordered to attack its target only after the evidence of an attack is unmistakable. But a ballistic missile, once launched, cannot be recalled. Yet, unless it is deployed in a mode which gives it a good chance to survive an attack, it too must be launched before the attack strikes home (i. e., within the relatively brief warning time) or risk destruction on the ground. I need not elaborate on the dangers of this situation.
>
> Accordingly, in reevaluating our general war position, our major concern was to reduce our dependence on deterrent forces which are highly vulnerable to ballistic missile attack or which rely for their survival on a hair-trigger response to the first indications of such an attack. Conversely, we sought to place greater emphasis on the second approach—the kind of forces which could ride out massive nuclear attack and which could be applied with deliberation and always under the complete control of the constituted authority.
>
> The problem of developing an adequate, secure, and controllable strategic deterrent involves not only the size and character of the bomber and missile forces but also the detection, warning, and other measures normally associated with the Continental Air Defense program, as well as the coordination and control of all our force in general war. We, therefore, carefully assessed all of these elements of the program as they were reflected in the January budget. Then we analyzed the most significant alternative combinations of program elements in order to arrive at an optimum "mix"; that is, a combination

> which would give us the kind and degree of defense we need at the least possible cost. Obviously, a large element of judgment enters into such analyses. Our conclusions are reflected in the proposed changes in the 1961 and 1962 general war program. . . .[16]

That the position of the B-70 in this "optimum mix" was less than completely secure has already been indicated. The proposed composition of the mix for the future was indicated by the Secretary's subsequent recommendations. With regard to the nuclear deterrent force they consisted of shifting emphasis from the liquid-fueled Atlas and Titan missiles to the solid-fueled Polaris and Minuteman. Because of its more advanced operational status, Polaris was given the greatest attention. Apart from the fiscal 1962 budget, the Kennedy administration had ordered fiscal 1961 building starts to be increased from five to ten. This action would eventually result in the 19th Polaris submarine reporting on station one year earlier than had been planned. With regard to the fiscal 1962 budget the President recommended the construction of ten more Polaris submarines, bringing the total to 29, with the overall delivery rate being increased from five a year to one a month. Additional money was recommended for the training of increased Polaris crews and the expediting of development of the more advanced A-3 Polaris missile.[17]

The Minuteman missile also gained increased attention in the program, although perhaps surprisingly concentration for the immediate future was to be on the fixed, hardened base version rather than on mobile squadrons. The emphasis here was apparently on getting the greatest number of

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[16] Ibid., pp. 4-5.

[17] House Defense Appropriations Hearings, 1962, Pt. 3, "Secretary of Defense, Chairman, Joint Chiefs of Staff, Service Secretaries and Chiefs of Staff," pp. 7-8.

the least vulnerable missiles in place with the least amount of cost.

The greatest amount of stress in the budget revisions appears to have been on improving the protection of the retaliatory forces. Fortunately this objective, through the means of the more recently perfected systems, seems to be attainable through methods which serve to increase the total missile inventory at the same time that they reduce the vulnerability. Although the Minuteman system does require hardened sites in the present model, it is considerably cheaper than its predecessor, even with such sites. With the mobile Polaris and the hardened but less expensive Minuteman, invulnerability is attained without such a large proportion of the defense expenditures being invested in huge mounds of concrete. Additional funds for an increased SAC alert also reflected this emphasis on protection.[18]

Other systems received modest increases. The Dyna-Soar, Skybolt, and Defender programs received some augmentation. Nike-Zeus barely held ground. There were no significant cuts in Bomarc program, although the failure to order it into production disappointed many of its advocates. Leading casualties in the rearrangement of expenditures to compensate for this increased spending were (besides the X-70 program) the nuclear-powered aircraft program, the Navy's Eagle-Submarine, and a group of 73 military installations which were scheduled for deactivation and closure. The Navy also lost its program to install Polaris on the nuclear-powered

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[18] Ibid., pp. 8-9. One might note however that there is a penalty entailed in moving in the direction of the smaller and cheaper solid-fueled missiles. As a general rule the warhead yield in these missiles is of a lower order than the liquid fueled Atlas and Titans. See pp. 135-42 for a discussion and comparison of the various factors relating to the liquid and solid fueled missiles.

cruiser Long Beach. The Air Force's Skybolt program was scheduled for inactivation and plans for the procurement of two as yet uncontracted for Titan II squadrons were dropped. Additional savings in funds and manpower were expected to accrue from the accelerated inactivation of obsolescent B-47 bombers, and no new funds for the additional procurement of any manned bombers were included in the budget.[19]

Apart from the foregoing actions, which were aimed primarily at the improvement of the nation's nuclear deterrent force, a strong emphasis on limited war forces was reflected in the revised budget.[20]

Congress Examines The Process

Reactions of the Congress to the proposed amendments to the defense budget are properly the subject of a subsequent section of this chapter. The detailed examination to which Congress subjected the arguments on the B-70 program will be outlined thereir. It is perhaps significant to note, however, that the Congress displayed not only a lively interest in the decisions, but also a similar concern with the manner in which the decisions were arrived at. A review of some of the questions and the responses thereto provide further insight into the decision making process.

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[19] Ibid., pp. 505-509 presents a detailed account of the budget amendments proposed by the Kennedy administration. A simplified tabulation showing by plus and minus figures the main points of the revisions may be found in Senate Military Procurement Authorization Hearings, 1962, pp. 28-29. An itemized listing of the increased expenses added by the President as a result of the "Berlin Crisis" may be found in Senate Defense Appropriations Hearings, 1962, pp. 1055-59.

[20] Senate Military Procurement Authorization Hearings, 1962, pp. 1[illegible]-25.

The nature and caliber of the advice provided to the Secretary in performing his determinations was placed under scrutiny by the House Defense Appropriations Subcommittee. The following dialogue between Rep. Mahon, the chairman, and Mr. McNamara is illustrative.

> Mr. Mahon. . . . I would like to explore with you this problem of how can you get reliable advice in this town.
>
> I have been sitting on this committee for 20 years. . . but it seems to me that the Congress and the President and the Secretary of Defense find it rather difficult to get the most helpful advice possible.
>
> We get so many conflicting views. The Army says we must go forward immediately into production of the XM-1[illegible] and others say no.
>
> The Air Force says the A-70 is essential and must be hurtled with all prudent speed and others say no.
>
> There is such a confusion of voices I am wondering how you are able to operate here.[21]

The Chairman further extended his remarks to include the Joint Chiefs of Staff and wondered, though hastening to point out that he did not question their sincerity or reliability, how they could separate their recommendations from service conditioning and experience. The Secretary was no less urgent in rising to their defense and averred that he had found only the most minor indications of parochialism. Having defended the integrity of the Joint Chiefs, Mr. McNamara then returned to the basic question and stated as follows:

> Secretary McNamara. If we grant their purpose is to advance the national interest, then the extent to which their discussion is conditioned by their experience and service

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[21] House Defense Appropriations Hearings, 1962, pt. 3, "Secretary of Defense, Chairman, Joint Chiefs of Staff, Service Secretaries and Chiefs of Staff," p. 50.

may be helpful and advisable and one of the ways in which I do obtain a complete view of the problem. If we have men whose only purpose in discussion is to achieve the best solution from the point of view of the nation as a whole, and they bring to that discussion a deep experience in one facet of the problem, then by examining all facets of the problem, I get a well-rounded picture. Actually, one of the ways I pursued these controversial issues, particularly the two you mentioned, the CVAN and the B-70, was by listening to proponents and opponents, both of whom were advancing the national interest, both of whom were specialized in certain aspects of the problem. Through this process, I have learned the weaknesses and the strengths of the arguments at hand.

Moreover, a second approach I have taken is to listen to their views and discuss the issues with the experts.

. . . In the case of the B-70, I visited the North American Aviation Co. and discussed the matter with certain of their key executives in Los Angeles for exactly the same reason; this, after having discussed each of these with the authorities in the Defense Department itself.

In the case of the B-70, I personally met with perhaps 8 or 10 of the top officers of the Air Force that have been responsible for the program to hear their views. I subsequently met with a group of men in another section of the Department who had different views. And, by interrogating the individuals concerned, the authorities on the issue, both those in favor and opposed to the matter, I feel that I have been able to penetrate the problem and develop what I consider to be sound solutions and conclusions.[22]

This passage is perhaps particularly illustrative of two of the basic operations of the decision maker, the seeking of technical advice and the evaluation of conflicting opinions. One might also note the necessity for the final decision returning ultimately to the person holding the responsibility. Advisors can only advise, they can but merely share the burden of decision, not eliminate it.

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[22] Ibid., pp. 30-31.

An additional cause for Congressional concern with the decision making process in the Department of Defense was the influence of scientists. This interest can be traced most probably to occasional mentions in the periodical press of the danger of the conflict of scientific advice based upon theoretical considerations with military advice based upon experience.[23] In answer to a question regarding the help Mr. McNamara had obtained from the scientific community on the B-70 and Nike-Zeus problems, the Secretary gave a reply which would seem to allay most fears and also delineate the influence of scientists in governmental positions. He answered

> A great deal of help, but I would say that the scientific community does not act with one mind on any of these highly controversial matters. You can find scientists on both sides of these questions, so it is definitely not correct to say that our recommendations are the product of a single-minded scientific community. There is no such community and particularly there is not as it relates to these questions.
>
> I did, however, have the advice of the best scientists that I could contact on both of these subjects and I personally discussed the issues with them.[24]

It may or may not be significant to note that the answer went beyond the question, which asked only what kind of help the Secretary had received from the scientific community. Whether or not this is an

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[23] e.g., Robert F. Schweitz, "Are Military Men Losing Decision-Making Roles?" Army-Navy-Air Force Register and Defense Times, LXXIII, (April 8, 1961) [illegible], 11-12.

[24] House Defense Appropriations Hearings, 1962, Pt. 3, "Secretary of Defense, Chairman, Joint Chiefs of Staff, Service Secretaries and Chiefs of Staff," p. 10. The role played by Dr. Herbert F. York, Director of Defense Research and Engineering in the Department of Defense, in the B-70 decision and his views on that program may be found in the above citation, Pt. 1, "Research, Development, Test, and Evaluation," pp. 8-35.

indication that representatives of the administration were sensitized by the amount of publicity having been given the intellectual make-up of the administration's advisers is problematical, but interesting.

The role of the Joint Chiefs of Staff is one which particularly interested Congress. It appears from testimony that the B-70 decision in itself did not come before the Joint Chiefs as a corporate body, although they individually were requested to give opinions on it. This relationship of the Joint Chiefs of Staff to particular problems of weapons selection is interesting. Despite the fact that they represent the most senior military authorities of the nation, they apparently do not pass on specific weapons systems as such.[25]

Ultimate source of authority in the Defense Department was also examined. Having complimented Mr. McNamara on his excellent presentation and the manner in which he had illustrated both sides of the controversy and described to the Congress his method of reaching the decision in question, Representative Andrews posed the question, "Yes, and you alone, made the decision, I assume?" To which the Secretary replied, "That is correct. Well, it is the President's decision, but I made the recommendation to the President on this."

This line of questioning stimulated further interest in the members of the subcommittee. Mr. Mahon, the chairman continued the line he had started earlier when he asked the Secretary

> It has been said that this amended budget is, to some extent, a product of the thinking of the scientific community . . . .I know the decision on the B-70 was not written by the

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[25] Ibid., Pt. 3, "Secretary of Defense, Chairman, Joint Chiefs of Staff, Service Secretaries and Chiefs of Staff," pp. 31-42.

Air Force, so who made these decisions?

Secretary McNamara. The decisions were made by the President, based on recommendations which I made to him, and the recommendations were my personal recommendations, based on long and exhaustive personal analyses and discussions with the parties concerned. For example, I spent several hours on 2 days, I guess it was.

General Lemnitzer. Two days.

Secretary McNamara. They were spent with the Secretaries and the Joint Chiefs together in the room next to my office, discussing the factors involved, their views and the decisions that I was tentatively thinking of at that time.[26]

Thus the Secretary touched upon two considerations, one of which is the question of the Joint Chiefs of Staff, the other is the ultimate responsibility of the President. From this passage we may deduce that the Joint Chiefs did play a part in the decisions, although a plenitude of testimony has indicated that they did not. The apparent contradiction may be resolved if one is to remember that the Joint Chiefs may act in more than one function. They can act as a corporate body, or they may act as individuals or as a group of individuals. It is in this latter capacity that they appear to have been acting in the discussions referred to by the Secretary of Defense.[27]

The mention of the President is merely of form. As the Chief Executive of the Government and the Commander in Chief of the armed forces the extent of his responsibility is readily apparent and does not require extensive examination at this point. But one may also note through the implications of the foregoing passage to what extent the President is dependent

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[26] Ibid., pp. 39-40.

[27] The point, heavily pressed both in the House and Senate is perhaps most clearly resolved in Senate Military Procurement Hearings, 1962. pp. 48-52.

upon his key subordinates. Any decision which he makes will obviously be shaped to a very high degree by his cabinet and other aides. Consequently it may be expected that any decision made by the President on defense matters will be to some extent, and in the absence of any serious schism, the decision of the Secretary of Defense. From this it may be seen that hierarchal relationships are important in the decision making process, but the degree of importance probably depends upon the circumstances and personalities more than it does upon the type of hierarchic structure.

Further elaboration on the structural relationships was solicited by the subcommittee members, and the replies given illustrate the relationship between the decision making process and the hierarchic structure.

> Mr. Sheppard. . . . What do you consider your constituted authority in the position you occupy and under the law insofar as final determination of any controversy within your jurisdiction is concerned?
>
> Secretary McNamara. Mr. Sheppard, that is quite a broad question. I do not have the authority to make final determination on many controversies associated with the defense program. Many of these matters can only be decided by the President.
>
> Mr. Sheppard. Perhaps I should have narrowed the question down to this: Considering the position of the President of the United States and your position under him, once a decision is made on that echelon, and there is still disagreement by and between the Joint Chiefs of Staff or other branches of the military, do you consider your position and determinations final in accordance with the President's?
>
> Secretary McNamara. Within the limits of our legislative authority, the authority of the President and that of the Secretary of Defense, I consider the decisions final. This relates not solely to the military but to the civilian members of the Department as well. I expect every member of the department to fully and wholeheartedly support those decisions and I have so stated on previous occasions.[28]

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[28] House Defense Appropriations Hearings, 1968, Pt. 3, "Secretary of Defense, Chairman, Joint Chiefs of Staff, Service Secretaries and

While the testimony of the Secretary of Defense relative to the reasons for his decisions and the methods of arriving at them fill literally hundreds of pages of Congressional Hearings, the foregoing is sufficient to provide an adequate illustration of the manner of execution of the decision making process in the B-70 question. One further quotation may be added, not so much for the light it sheds on the B-70 question, as for the illustration of the reasoning of the person responsible for the decision.

Weighing Alternatives--An Illustration

Congress, through its subcommittee, had during the course of the hearings on the defense appropriations, expressed considerable concern over the fact that the proposed budget contained no funds for the future purchase of any manned bombers. The Secretary of Defense was presented with the question of what the administration might do if the Congress appropriated money, above that requested, specifically for the purchase of manned bombers. The Secretary replied that he would recommend that it not be spent. He then presented an analysis of possible actions which is highly pertinent to the problem of weapons selection:

> . . . I think the question of what we should do with additional moneys if they are available is something which is of interest to you.

Chiefs of Staff," pp. 64-65. That the Congress does not always have such a high regard for the integrity of the hierarchic structure may be deduced from the comments of Senator Chavez to General White during his testimony. Having commented upon the necessity of the military to abide by the decisions of their civilian superiors he also further observed that the members needed the views of the military to execute their duties and concluded by observing "I have great faith in the Secretary, but Secretaries are itinerant. The military folk are always present. We place greater dependence upon you." See Senate Defense Appropriations Hearings, 1962, p. 276.

We really have at least four alternatives if you wish to consider spending a billion dollars. It would cost just about $1 billion to procure any one of these four systems I will mention and operate them for 5 years.

It costs about $1 billion to buy 40 B-58's and operate them with their required tankers for 5 years.

It costs about $1 billion to buy the unit equipment for a B-52 wing, 45 aircraft, and operate them with their required tankers for 5 years.

It costs about $1 billion to buy 150 MINUTEMAN missiles, hardened fixed site missiles, and operate them for 5 years.

It costs about $1 billion to buy 6 POLARIS submarines with a total of 96 missiles, of which you could consider roughly 64 on station at any one time, and operate them for 5 years.

Therefore, the first question is do you need any one of these additional forces, and, if you do, which one of the four should you buy? They all cost approximately the same.

The easiest decision for me to make is that we should not buy the B-58. I am just starting at the bottom of the list. Of that I am certain.

The reason I am certain of that is that the range of the B-58, and certain other of its characteristics, are far less attractive than the characteristics of the B-52. I believe I am correct in saying that the B-52's unrefueled range is greater than the B-58's range with a single refueling. This gives a tremendous advantage to the B-52 for the type of targeting toward which it would be directed.

The MINUTEMAN, if you wish to contrast it against the B-52's and B-58's, would provide a substantially less vulnerable system; 150 hardened dispersed MINUTEMEN versus 40 or 50 B-52's or 58's on one to three soft basis [sic]. Considering vulnerability to enemy attack as well as losses in flight and in penetration, the MINUTEMAN promises to provide a greater assurance of effective retaliation.

The POLARIS offers still further advantages perhaps, even over the MINUTEMAN, for the reasons your committee has pointed out so many times in the past. So I am positive in my mind I would not wish to use the funds for the purpose of the B-58's.

I am not sure, if I had to choose between B-52's or MINUTEMAN or POLARIS, what the decision [sic] would be. I would lean today toward either POLARIS or MINUTEMAN.

Mr. Flood. What happened to the mix?

. . . . . .

Secretary McNamara. Why not mix within the four?

Mr. Flood. Precisely.

Secretary McNamara. Because each of these, particularly the aircraft units, are optimum-sized operational elements. A wing of aircraft is about as small an aircraft unit as we would wish to add to our force. That is about 40 aircraft.

Mr. Flood. You cannot mix half a wing and three squadrons?

Secretary McNamara. We could, but---

Mr. Flood. It would be a horse and a rabbit?

Secretary McNamara. It would not be a wise move.[29]

Although the foregoing colloquy does not relate directly to the B-70 decision it is indicative of the problem of mix determination. It is certainly pertinent to the question of weapon selection and illustrative of the types of problems and the approach to their solution. As such it is a valuable insight into the decision making process.

Summation

A review of the foregoing sections will indicate that the most precise and comprehensive review of the decision was contained in Secretary McNamara's original presentation of that decision. A summation of the major points stressed will serve to conclude the examination of the decision.

The major factors activating the decision not to proceed with full scale development of the B-70 as a complete weapon system were:

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[29] House Defense Appropriations Hearings, 1962, Pt. 6, "Nuclear Propulsion, Appropriation Language, Amendments to the Budget, 1962, Statements of Members of Congress, Organizations, and Interested Individuals," pp. 193-94.

1. An increase in the total number of strategic systems.

2. Operational availability not attainable prior to 1963.

3. The availability of a substantial number of manned bombers capable of carrying air-to-ground missiles.

4. The necessity for a quick ground reaction time in a missile environment.

5. Complexity and cost.

6. Vulnerability on the ground.

7. Vulnerability in the air, particularly to possible defensive systems operational in the late 1960's.

8. Incompatibility with planned air-to-ground missiles.

9. Subsonic speed at low levels.

10. Unsuitability to airborne alert measures.

11. Possibility of a better system.

The arrangement of these factors does not necessarily indicate any particular priority, nor does the Secretary's enumeration of them give any indication that he considered one more important than another. As opposed to these eleven negative aspects, he listed only two in favor of continuation of a full-scale program. These were:

1. The ability to operate under positive control.

2. The ability to carry large numbers of nuclear weapons.

From the previous discussions of the advantages of manned aircraft it would seem obvious that advocates of that system could find substantial numbers of factors to add to this list. That the Secretary of Defense did not choose to include them in his presentation may indicate that he did not consider them to be of sufficient import to warrant inclusion, that the

delineation of the disadvantages automatically eliminated them from consideration, or, there may have been other reasons which can be evolved only by conjecture, as were the foregoing. As shall be seen, however, the Congress lost little time in confronting him with the points his statement overlooked.

Regardless of the motivation for not including a larger number of considerations favorable to the manned aircraft it is apparent that in the outlook of the person responsible for the decision, the number of advantages of the B-70 was outweighed by a ratio of disadvantages of over five to one. Such a relationship would seem to indicate that a program with such a set of disadvantages was a prime candidate for outright cancellation. A moments reflection, however, will bring to light a rather important aspect of decision making, and that is the relative weight of each factor being placed in judgement. It is possible that either of the two favorable points mentioned could be of sufficient import to outweigh any or all of the unfavorable aspects. The ability of the aircraft to operate under positive control and thereby provide a higher degree of flexibility than the missile might certainly be a consideration of this magnitude. On the other hand, if the state of defensive system development trends indicate that low-level attacks are the more feasible future offensive tactic, and the B-70 in fact would be a subsonic vehicle in those altitude ranges, then the B-70 has little or no advantage over existing and proven bombers. The [illegible] of weighting each individual factor could be played indefinitely and probably to little advantage inasmuch as the sources cannot for security reasons reveal all of the information upon which the Secretary based his decisions. The limited discussion here has been to illustrate how the weight

or priority of each specific factor can vary the balance upon which the decision depends.

In addition to the advantages and disadvantages there were stated a third set of factors--the uncertainties, which were:

1. The operational characteristics of the missile force.

2. Advantages inherent in a mixed missile and bomber force.

3. B-70 development would provide an opportunity to examine the technical problems of high speed high altitude flight in large aircraft.

Now these last three factors might be evaluated as of the type which more rightly should have been included in the second group, i.e., reasons for the development of the B-70 as a weapon system. They were not so included, possibly, for the reason that none of them by themselves could be considered as a reason to justify the B-70 as the manned bomber for inclusion in the mix. Rather, these factors represent a type of consideration which might be called variable or contingent. Mr. McNamara described them more simply and perhaps more clearly when he termed them "uncertainties."

The uncertainties are possibly the most important of all factors to be considered in the decision making process. If it were not for such considerations decision making would hardly be a problem worthy of study. But we see that they are of sufficient gravity to cause a man of seemingly decisive nature to avoid a final and absolute decision. Perhaps this balancing of present actions against present uncertainties represents the true objective of the decision making process.

Although the subject of past investment in the B-70 program was examined at length during the subsequent Congressional questioning of

Mr. McNamara, in the original testimony concerning his decision the Secretary limited financial justifications of his decision to the immediate saving of $138 million and the option of eventually saving $1.4 billion. These are of course important considerations, but no mention was made of the past investment of $900 million.[30] Consequently we cannot at this point determine whether or not the extent of past investments exerted any influence on the decision. It should be noted that the Secretary's actions on other programs gave ample indication that he would not be prone to preserve those which he might consider inappropriate simply because they represented large investments. Despite the lack of reference to past investments we can make two observations at this point which should be kept in mind when reviewing the process of decision. First, there is most probably an interaction between past investments and present uncertainties which is operative in the formulation of a decision. Secondly, there is the problem of balancing the desire to recoup some return from past investment against the danger of "throwing good money after bad."

IV. CONGRESSIONAL REACTION

As of this point the examination of the decision on the B-70 program has been completed in detail sufficient to the scope of this study. The background factors pertinent to the decision have been delineated and the decision, as it relates to these factors, has been analyzed. In regard to a particular decision at a particular point of time the study can be called complete. The Secretary of Defense, acting in his capacity as the civilian

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[30] Further discussion of this aspect may be found in section IV, infra.

head of the military establishment has recommended to the President, the Commander in Chief of that military establishment, that the A-70 development be continued only as an aerodynamic prototype, not as a weapon system. The President has seen fit to concur in that decision, the concurrence being reflected in the budget amendments submitted to Congress. A point has been reached whereat finis could be appended to the study and the task of drawing conclusions undertaken.

Yet the nature of the government of the United States suggests that the investigation be carried at least one more step further. In a sense this further step is something in the nature of an epilogue. This next step examines what happened to the decision once it was made. From this examination it may be possible to deduce at least a small part of the relationship between the decision making process and the structure of the government.

The Constitution of the United States assigns to Congress the power and the responsibility to provide for the common defense, declare war, raise and support armies, provide and maintain a navy, and to make rules for the government of the land and naval forces.[31] The President, on the other hand, "shall be the commander in chief of the army and navy of the United States."[32] Thus we have one specific example of the much discussed system of checks and balances. Within this framework of checks and balances, it will be a rewarding undertaking to examine briefly just how the Congress reacted (as representatives of the people) to the decisions presented by the administration.

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[31] U. S. Constitution, Art. I, Sect. 8. [32] Ibid., Art. II, Sect. 2.

The interest of Congress in the decision making process has already been shown. This may be regarded as something of an investigation of the quality of the process and of the inputs to it. What will be reviewed the attention of Congress to the wisdom of the decision.

Congress Examines the Decisions

The Secretary of Defense not only advised the Congress of the decision he had reached, he also summarized the process and the reasons for the decision. It should by no means be assumed that Congress failed to challenge some or all of these reasons. This they did in great detail, in such detail in fact, that a complete summary would be inordinately large for inclusion here. Rather, the basic points of contention between Congress and the administration and the administration's reply to these points will be summarized. Citations will not necessarily include all instances of discussion of a particular point, but rather the most lucid or illustrative examples uncovered.

Congress immediately arose to ask whether the administration action indicated that they were abandoning the concept of a mixed deterrent force. The Secretary of Defense pointed out that the decision did not overlook the need of manned bombers, but that the country possessed bombers in adequate numbers into 1966, by which time a decision could be made to develop the B-70 as a weapon system should such action prove advisable.[33]

This line of questioning had the corollary aspect as to whether or not a delay would not result in an eventually greater cost of the system.

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[33] Senate Military Procurement Authorization Hearings, 1964, pp. 90, 111.

to this reply was made that such an eventuality was certainly a possibility, but in the meantime an immediate and definite saving would accrue as compared to only a possible future increase in expenditure.[34]

In view of the foregoing Congress wanted to know why both proceeding at full speed with the complete development or outright cancellation were not preferable alternatives to a delay in the final decision for at least one year and only partial development. The $500 million already invested, the uncertainty as to the future, the lower cost of the proposed development program, and the technical benefits accruing from the development of the airframe prototype were all listed as reasons favoring the recommended program as opposed to either acceleration or cancellation.[35]

Some interested solons desired to know whether or not the B-70 did not have significant merit as a commercial transport. To this the Secretary replied that it did not, although he indicated that there certainly might be technical side-benefits from the knowledge gained in the development of the B-70.[36] Questions addressed to the Secretary, and also to the somewhat more partisan Air Force witnesses indicated concern as to whether or not abandonment of the B-70 as a weapon system meant the end of progress in the aeronautical sciences in this country. Some of the staunchest advocates of the B-70 displayed apprehension that the recommended program

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[34] Ibid., pp. 75-78.

[35] Ibid.; for opinion as to why complete cancellation of the program would not be desirable see Senate Defense Appropriations Hearings, 1960, pp. 18-19.

[36] Senate Military Procurement Authorization Hearings, 1960, pp. 59-60.

did indeed foreshadow such an eventuality,[37] but Mr. McNamara took a less doleful view and felt that the present program certainly did not indicate that American aviation was returning to Kitty Hawk.[38]

Congress showed no less interest in many of the tactical aspects of the B-70. It asked whether or not the B-70 might be an excellent vehicle for the launching of conventional weapons, to which reply was made that it could carry such explosives but that the dollar cost of transporting such limited destructive capacity was to say the least uneconomical.[39] The statement as to the inability of the B-70 to carry and launch air-to-ground missiles came under strong scrutiny. Testimony in effect indicated that the B-70 was actually and in fact not designed for present or projected missiles, but that adapting the plane to them or designing a missile for the plane posed no insurmountable problem.[40] Air Force witnesses were also examined upon the statement that the speed and altitude capabilities of the B-70 would not offer significant advantages over defensive systems projected for its era. On this point considerable disagreement was perceptible. Whereas many of the other points might have been somewhat equivocal, on this there was a definite belief on the part of the Air Force that the B-70 or similar Mach 3 aircraft could penetrate defenses.[41]

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[37] Posture Briefings, p. 1170.

[38] House Defense Appropriations Hearings, 1962, Pt. 3, "Secretary of Defense, Chairman, Joint Chiefs of Staff, Service Secretaries and Chiefs of Staff," pp. 125-26.

[39] Senate Military Procurement Authorization Hearings, 1962, p. 82.

[40] Ibid., pp. 335-37, 350, 390.

[41] Ibid., pp. 444-45, Senate Defense Appropriations Hearings, 1962, p. 1549.

Similarly, on the question of speed at low altitudes, at least one witness stated flatly that the B-70 was a Mach 3 aircraft and not designed to operate at other speeds.[42]

Interest was also apparent in the question of other systems better adapted to the missile age environment. Mr. McNamara stated that in this regard he was definitely not considering a Mach 3 aircraft, but rather something possibly similar to the "Dromedary" concept.[43]

One concern of Congress which recurred frequently was the worrisome fact that a nuclear warhead had actually never been detonated after the termination of an ICBM flight. There was no palpable proof that the nuclear device could survive the rigors of a space flight. Secretary McNamara assured the Congress that leading scientists in the field had assured him "beyond any reasonable doubt" that successful functioning would be forthcoming after such a flight.[44]

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[42] Senate Military Procurement Authorization Hearings, 1962, pp. 355, 390.

[43] Ibid., pp. 93-94. See also House Defense Appropriations Hearings, 1962, Pt. 3, "Secretary of Defense, Chairman, Joint Chiefs of Staff, Service Secretaries and Chiefs of Staff," pp. 52-54. Though the analogy is not completely accurate, the "Dromedary" concept may be likened to an aerial counterpart of a Polaris submarine. Basically, a large aircraft of long endurance is kept airborne over long periods of time thus relieving to a certain extent the characteristic aircraft vulnerability to attack while on the ground. This aircraft would carry ballistic missiles for attack against distant targets upon command of the controlling agency. While the aircraft is probably more vulnerable to detection and interception, has a much lower endurance, and is more dependent upon basing facilities, a relationship in tactical employment can be seen to the Polaris submarine concept. For a more detailed account see Ibid., Pt. 4, "Research, Test, and Evaluation," pp. 36-37.

[44] Senate Military Procurement Authorization Hearings, 1962, p. 30. It may be of passing interest to note that at least one national newspaper saw fit to observe that, after appropriating extensive funds

The foregoing and additional points could be examined to much greater length. These are sufficient however, to illustrate the degree of interest manifested by the Congress and the detail in which it examines various aspects of the question.

The next logical area of interest is that which refers to the action Congress took to illustrate its approval or disapproval of the decision.

Congress Acts

While a detailed presentation of the history of authorization and appropriations measures from inception to enactment might be of interest to the student of political science, such an involved analysis is hardly appropriate to this study. Our particular interest at this moment is in the manner in which the Congress manifested its reaction to the decisions of the administration in regard to the B-70 bomber. The legislative and parliamentary mechanics of the action do not immediately concern us.

There has been ample indication of Congressional concern with the administration's decisions not to continue production of manned bombers and to cut back the B-70 program. The extensive testimony of Air Force witnesses in support of the latter program has been noted. In view of the contradictory opinions emanating from the Department of Defense, the Congress apparently was of the opinion that further evaluation of the decision presented by the Secretary of Defense was called for and it

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For missiles for the past several years, this was a rather peculiar time for the Congress to start worrying about whether they would work or not. See editorial, The Christian Science Monitor, May 13, 1961.

apparently undertook to reevaluate the situation on its own. The results of this reevaluation may be seen in the language of a few of the various committee reports on the authorization and appropriations bills. In reporting on the authorization bill the Senate Committee on Armed Services, through its chairman, stated in regard to funds for long-range bombers

> The committee has increased the authorization requested by $525 million. This added amount is intended only for the procurement of long-range manned aircraft for the Strategic Air Command.[45]

This statement is followed by a review of the various advantages and disadvantages of missiles and aircraft which included those factors already mentioned in the body of this work. The discussion concluded

> After considering all these factors, the committee was convinced that the option to procure more manned bombers should be preserved. In the committee's opinion, the B-52 is the most effective long-range manned aircraft that can be procured immediately.[46]

The committee made specific the fact that this in no way was meant to limit the B-70 program. Under the authorization heading of Air Force Aircraft a statement was included that

> The total of the authorization for Air Force aircraft includes items for the continued development of the B-70, a supersonic strategic bomber . . . . Since items still in the development, test, and evaluation stage are not subject to the authorization requirement, the committee has left the amounts for these . . . programs intact in the realization that additional amounts for the development, test, and

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[45] U. S. Congress, Senate, Authorizing Appropriations for Aircraft, Missiles and Naval Vessels for the Armed Forces for Fiscal Year 1962, Report, 87th Cong., 1st Sess., Calendar No. 227, Report No. 253, p. 3. (Hereafter referred to as Senate Report No. 253.)

[46] Ibid., p. 4.

> evaluation of these aircraft types could be appropriated for under the "Research, Development, Test, and Evaluation" titles without violating the requirement for authorization of appropriations for the procurement of operational aircraft.[47]

Subsequent to the passage of the authorization bill, the House Appropriations Committee, reporting on the appropriations bill had this to say

> . . . the Committee is concerned over the slow-down in the B-70 program and over the future of the long-range bomber program generally.
>
> . . . . . .
>
> The Committee recommends a total appropriation for the production of long-range bombers in the sum of $440,840,000 and has so ear-marked these funds in the bill. . . .
>
> The Committee feels that first preference in the use of available funds should be given to the acceleration of the B-70 program. However, it is not meant by this recommendation that the Defense Department should be prohibited from utilizing the funds provided, in the long-range bomber account, for other long-range bombers.[48]

As may be seen, Congress, at this point was willing to allow the exercise of a considerable amount of discretion within the Department of Defense with regard to the course of action they might take. Congress was in effect saying that they did not concur with the decisions reached in the Department, but that there appeared to be a good possibility that they were correct. In case existing circumstances should change, however, Congress was appropriating enough money to allow the Department to readjust its position. In a case such as this Congress appears to be

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[47] Ibid., p. 13.

[48] U. S. Congress, House, Department of Defense Appropriation Bill, 1962, Report, 87th Cong., 1st Sess., Report No. 574, p. 7. (Hereafter referred to as House Report No. 574.)

registering disapproval, but not strong enough disapproval to force the issue. They simply made the money available in case there should occur a change of mind within the Defense Department. The Defense Department, on the other hand, was not actually obligated to spend the money, and could persist in its original decision should it so desire.

During the course of Congressional action on the Defense Appropriation bill, however, external circumstances changed considerably. The more or less perennial "Berlin Crisis" began to gain in intensity, and in the midst of this crisis, the Russians added impetus to the manned bomber controversy. In a massive air show in Moscow, the Russians unveiled a variety of new military aircraft which included a number of new, large jet bombers.[49] Although the Air Force professed that there was little if anything in the show which their intelligence had not led them to expect, the Congress displayed a lively interest in the Russian demonstration. Whether or not this Russian action had any effect on the final outcome of the actions of Congress is again highly problematical. In view of the Berlin situation Congress was in no mood to haggle over defense expenditures and it is probable that the final action on the B-70 program would have been the same with or without the Air Show. It might be speculated, however, that the Russian demonstration certainly did not hinder the B-70 program.

A heightening note of urgency on the part of Congress may be noted in the Senate Appropriations Committee report on the Defense appropriation

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[49] See Stanley Johnson, Associated Press dispatch, "Reds Show Air Might; Norstad Cites Unity of West on Berlin," The Washington Post, July 10, 1961.

bill, which in part stated

> During a decade and more this committee has voted billions of dollars for strategic deterrence. The bulk of this money has gone to the Strategic Air Command for manned bombers. That the strategy has worked is self-evident. Now we approach a new and relatively untried era in the field of missiles, space, and advanced technology. On one hand, we are told that ballistic missiles, once they are proved and are of sufficient quantity, will replace the manned systems as a deterrent. We are also told by the Air Force Chief of Staff that, even in the age of ballistic missiles, there are still two--
>
> > incontestable, overriding mandates for the continuation of manned systems, the first of these concerns the awesome decision to commit the force * * * the second mandate for the manned systems concerns the perpetual requirement for operational flexibility * * *
>
> Thus, we view the B-70 cutback and stretchout with grave concern and serious reservations. We question whether this Nation can afford to place full dependence on an operationally untried and untested missile force.
>
> It is this committee's firm belief that we will continue to require advanced manned strategic systems to meet the multipronged threat which our potential enemy poses. We must be able to adjust to the unpredictable and unexpected, and to operate despite imposed restraints, political and otherwise. In case of a nuclear ban, ballistic missiles would be useless. The Nation must be able to respond adequately and effectively to the entire spectrum of conflict, and we must have continued and urgent development in our aeronautical sciences to accomplish this--we still have a huge stake for scientific development within our own atmosphere. We feel the B-70 offers the most advanced step in manned strategic systems for the operational inventory. It is the committee's desire that the DOD plan a firm program for the B-70 which will have as its goal placing the required number of wings in operational configuration at the earliest possible date, and that this program be presented to the Congress not later than January 1, 1962. For these reasons, and in the meantime, the committee is making available in the appropriation for "Research, development, test, and evaluation, Air Force" the sum of $440,040,000, of which $225,040,000 is in addition to the budget estimate for use, as the Secretary of Defense may direct, to expedite the B-70 program.

> Also, the sum of $525 million over the budget estimate and the House bill has been added for the procurement of long-range manned bombers under "Air Force procurement."[50]

The funds which the Senate had recommended were cut slightly in the joint House-Senate conference committee on the final appropriation bill. The language of the report is as follows

> Amendment No. 25 . . . The Committee of Conference is in agreement that $400,000,000 of this appropriation shall be available for the B-70 program. . . .[51]

Despite this slight cut, the funds allotted are almost twice the amount requested by the administration. The intent of Congress that the B-70 program be pursued as a complete weapon system is evident. It was in this form that the appropriation bill finally passed Congress.[52]

Thus Congress expressed rather complete disagreement with the decision of the President and his Secretary of Defense. It gave unmistakable indication that it desired the B-70 program to be pursued with all practical haste. Money apparently adequate for the task was appropriated.

But as has been frequently noted, Congress cannot force the administration to spend money it has appropriated. Thus, the administration is faced with another decision. Not only must the B-70 program and previous decision be evaluated in the light of changing conditions, but the added factor of possibly flaunting the intentions of the Congress and the people

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[50] U. S. Congress, Senate, Department of Defense Appropriation Bill, 1962, Report, 87th Cong., 1st Sess., Calendar No. 623, Report No. 653, p. 5. (Hereafter referred to as Senate Report No. 653.)

[51] U. S. Congress, House, Department of Defense Appropriation Bill, 1962, Conference Report, 87th Cong., 1st Sess., Report No. 873, p. 7. (Hereafter referred to as House Report No. 873.)

[52] Congressional Record, CVII, August 10, 1961, pp. 14262-76, 14393-96, D688.

in the matter of National Defense must be carefully considered. The stage is thus set for another examination of the decision making process.

CHAPTER VII

CONCLUSIONS

I. RECAPITULATION

Preceding chapters have reviewed in some detail the history of an aircraft and a weapon system of which it was to be a part. This history has been a somewhat long and complex one for an aircraft that has yet to make its initial flight. But if the complexity of the history and the effort expended in its compilation do not strike the reader as incongruous, then this study has been at least a partial success. For there is nothing essentially incongruous in a massive pre-history for a modern weapon system. The nature of such arms in fact demands it. They cannot come into existence without extensive preliminary effort.

If the reader undertook his review of this study with an appreciation of these facts the appropriateness of an endeavor such as this requires no justification. But if, on the other hand, this study has engendered such an appreciation, then it has served a double purpose. In the first instance the reader will have had the opportunity to review the manner in which difficult decisions were rendered in a complicated issue. In the second case the reader will not only have had this opportunity, but will have achieved an understanding of why the decisions are so complex and difficult. He will further appreciate the intense nature of the responsibility resting upon the decision maker.

In order that the more important relationships pertaining in this investigation may be kept in mind, the conclusions to be set forth in this

chapter will be prefaced by a brief review of the relevant factors established in the body of the work.

Resume

In any discussion of weapons it is important to remember that such devices are only a means to an end. That end is the implementation of a military posture which will satisfy the demands of national security. To emphasize these factors the relationships of strategy, security, and policy were examined. The need for a strong defensive position to support an active and dynamic foreign policy was established. Military policy and military implements were seen to be required to maintain this strong defensive position. The military strategy adopted to preserve this position has been that which is called deterrence. The military organization of men and weapons which represents this strategy is the deterrent force. This force must not only deter an all-out nuclear war, but also limited wars and piecemeal aggression. The highly psychological nature of a deterrent philosophy is hinted at by the fact that the less the deterrent force is employed the more successful it is.

With deterrence established as one of the prime objectives of United States policy, both military and national, the combination of the strategies best suited to guarantee deterrence, and the material make-up of the forces to implement this strategy next required examination.

Finite deterrence, counterforce, and limited war forces were seen to be the primary strategic philosophies proposed for the implementation of deterrence. The decision maker has before him the task of choosing between these philosophies, or between combinations of them. In most cases the

substance to the theory by deciding upon the weapons to be selected to implement his decisions. This then is the relationship of the B-70 to the questions of strategy, security, and policy.

Having examined the background against which decisions must be made, the various types of decisions were listed. While various categories of decisions were developed, it was seen that only in the most simple situations could a single category apply to any one specific decision. In general, numerous factors, and consequently numerous categories were contingent to any question requiring decision. This interrelationship serves to render more difficult the task of the decision maker.

Returning more closely to the central problem of the study, the issue of weapons selection was examined with particular attention being given to the determination of the "mix." In the case of deterrence or an all-out nuclear war this mix was seen to be primarily a question of the ratio of missiles to manned aircraft in the deterrent force. To assist in the analysis of the decision under consideration the generalized advantages and disadvantages of missiles and aircraft were delineated. The most obvious distinction between the two systems was the inflexibility of the missile as opposed to the variety of operational modes in which the aircraft might be employed.

From the discussion of weapon systems in general the study proceeded to examine an individual system in detail. This system was the Air Force's proposed B-70 "Valkyrie" Mach 3 intercontinental bomber. The unclassified details of the B-70's characteristics, performance, and projected operational capabilities were reviewed. The rather eventful history of the B-70 program was outlined so that past decisions could be compared to those under

study and thereby a better basis for evaluation achieved.

Finally, the decisions of the Kennedy administration with regard to the B-70 program were listed. These decisions are reflected in the fiscal year 1962 defense budget. The study profited greatly by the fact that the Secretary of Defense took pains to spell out in particular detail to the various congressional committees before which he testified not only the reasons for these decisions but also the relationship of the decisions to the military strategies of the United States.

Having covered in brief summary the main points of the work thus far the next and final step is an attempt to delineate those conclusions which have become evident or which can be inferred from the material presented.

II. CONCLUSIONS

Conclusions of this study will, for simplicity, be grouped under four main headings. The first heading will encompass those conclusions which relate to the security policy of the United States, and which includes as a natural component thereof the questions of composition of forces and weapons selection. In particular an attempt will be made to determine wherever possible the evolution of trends, either towards a changing policy or affirmation of existing policies and concepts.

Subsequent conclusions will be concerned with the B-70 aircraft itself. What this study may have revealed about the characteristics of the governmental structure of the United States, insofar as it relates to security policy, weapons selection, and the decision making process, will be included under a separate heading. A limited number of conclusions

relative to the B-70 itself will be stated. Finally, observations concerning the decision making process itself will conclude the chapter.

Relative to National Security Policy and Composition of Forces

This study has affirmed that there is no indication of any departure from the philosophy that deterrence is a basic objective of United States security policy and military policy.

Investigation has further shown that the basic and often stated tenet of United States policy that this country will never strike the first blow in an atomic war remains unchanged.

The ability to retaliate swiftly, by an attack abroad is the basic operational component of the strategy of deterrence insofar as all-out nuclear war is concerned. As has been previously stated in this study, it is of the utmost importance that the much discussed doctrine of "massive retaliation" attributed to the late John Foster Dulles, which in essence was the utilization of the threat of atomic warfare to counter any form of aggression, not be confused with the determination to utilize the capability of inflicting massive or "unacceptable" damage upon an enemy in retaliation for a nuclear attack against the United States or one of its allies. Though there might be those who would complain that the very limited definition of the concept of massive retaliation given above does not do full justice to the theory, the abbreviated form is used for the sake of simplicity. Constraining the enemy by inducing the fear of damage to himself is the essence of deterrence, and consequently, the capability to inflict such damage is the material factor of deterrence.

In regard to the various theories for the implementation of the strategy of deterrence, neither counterforce nor finite deterrence and

be clearly determined to be preponderant in the composition of the deterrent force. If any trend can be discerned, it would seem to be in the direction of an attempt to gain maximum utilization of the nation's capabilities in the military field within a realistic economic framework. In other words, there seems evident an attempt to "optimize" the composition of the military forces. This procedure has as its objective the tailoring of these forces to objectives and circumstances of the nation with the least practical cost. It is an attempt to develop the most "efficient" defense establishment--achieving the greatest (which as used here presumes requisite) capabilities for the least expenditure. Such a procedure does not infer that this is an attempt to get by cheaply, for it is entirely conceivable that under such a procedure a more expensive weapon might be chosen in preference to a cheaper one if the former in fact better suited the circumstances.

Some might see in the increased expenditures for Polaris submarines and protected Minuteman missiles, particularly when compared with the failure to request any additional funds for the procurement of manned bombers and in the restriction of the F-70 program, a bias in favor of the theory of finite deterrence. While the possibility exists that this indeed could be the case and this conclusion, consequently, completely erroneous, it is not felt that complete analysis will confirm this possibility. Rather, the decisions of the Kennedy administration seem to favor, if anything, the balanced force concept. Again, however, this study prefers to conclude that the decisions represent an attempt to tailor the armed forces to the needs and situation of the nation. There is also the possibility that the decisions represent an attempt to reduce past emphasis on one particular arm.

The greatest emphasis of the decisions is on the protection of the retaliatory force. This is in line with the official policy of the United States which foregoes the opportunity to launch the first strike. Implicit in the attempts to achieve an invulnerable deterrent is the appreciation that the retaliatory force will in all probability have to be of such a nature that it will be capable of "riding out" the enemy's nuclear attack and still maintain adequate potency to inflict the "unacceptable damage" which the theory of deterrence postulates. It might be noted that mutual invulnerability on the part of two antagonists makes for a very stable deterrence, and thereby approaches (but does not guarantee) a nuclear stalemate. The emphasis on protection of the retaliatory force leads logically to the next conclusion.

The nation apparently possesses deterrent or retaliatory power sufficient to its needs. If this were not the case the desire to ensure protection of the retaliatory force would most probably have been accompanied by actions designed to increase the size of the retaliatory force, not only in new missiles, but also in manned aircraft. The defense budget seems to indicate that a transformation of the retaliatory force into a more secure and protected configuration is a more pressing objective than is the mere increase in the size of that force. Such remarks bring to mind the popular terms "missile gap," "destruction gap," and "deterrent gap," which phrases this study has assiduously attempted to avoid. Of the three the last is the one which carries the greatest logical incorrect, but regardless usage has tended to reduce the integrity of the terms to a point where their real import has been lost. One of the secondary aims of this study has been to approach the questions of security, decision, and weapon selection in a manner

which would preserve a certain freedom from just such conceptions that have tended to become distorted beyond utility in the political and journalistic arenas. If the reader has obtained any benefit from this study, he will be in a position to evaluate the foregoing conclusion apart from the dogma of popular phraseology. The importance of deterrence exists not in the comparison of absolute numbers of arms but in the adequacy of those arms to the objectives they are intended to attain.

With regard to the size and composition of the deterrent force, a review of the sources has indicated that the manned bomber is presently the primary component, both in numbers and in relation to desirness of employment, of the deterrent force. The discussion of the relative advantages of missiles and aircraft has stressed the unproved nature of the missile and its great complexity. The failure of the administration to request funds for further bomber procurement does not indicate that missiles are yet the primary arm of the deterrent force, but rather that the force contains bombers in sufficient number and that further financial outlays would be devoted to the performance and procurement of active missile systems. While missiles may have achieved a high degree of popular regard and there may even exist a popular misconception that they represent the primary striking power of the United States, the salient fact is that bombers have embodied and will continue for at least the next few years to embody the primary offensive strength of the strategic air command.

A further aspect of the adequacy of the deterrent force leads to still another conclusion, and that is--not only is our deterrent force considered adequate, but it is adequate to the point that responsible officials of the Defense Department can afford the luxury of a more critical review

of proposed weapon systems. This is of course most obviously reflected in the decision to delay final commitment relative to the production of the B-70 for another year. This delay can be accepted apparently without fear that the consequent retardation in production and availability in operational strength will leave our nation without an adequate deterrent force. It does not necessarily follow, however, that the nation is in no danger. But danger is a characteristic of the age. What does follow seems to be that the nation has made a tentatively adequate adjustment, at least in the eyes of its responsible officials, to that danger.

Continuing with conclusions relative to the composition of the deterrent force, something of a corollary to the question of the development of the B-70 suggests itself in regard to missiles. While missiles have not yet demonstrated the degree of reliability desirable in a major weapon system there seems to be confidence that solid difficulties will be overcome in the near future. If this were not the case it seems inconceivable that the administration would not have requested funds for continued build-up of the manned bomber force. Even if the bomber force were considered adequate, doubt in the near future attainment of satisfactory operational reliability of missile systems would probably have been reflected in measures to maintain present production facilities and a decision to proceed with development of the B-70 as a full weapon system.

The lack of financial expenditures for production of manned bombers and development of the B-70, however, should not be taken as a refutation of the theory of the "mix." Simple testimony has indicated that the concept of a mixed bomber and missile force still remains valid and will remain so

for the next several years. The main question which is to be answered is when will the cross-over point, i.e., that point when the missiles attain preponderance over bombers, be reached. If the date of operational availability of the B-70 as a complete weapons system and the projected date of obsolescence of the present manned bomber force are related to the Administration's actions, then it would seem that the present belief is that the cross-over point in the air will be reached sometime before 1966. While it is possible that this date may be susceptible to variation within a limit of one or two years, any further variation would be difficult to reconcile with the actions of the administration.

Despite apparent indications of greater dependence on the ballistic missile as a major component of the deterrent arsenal, there is significant evidence that the inflexibility of the missile remains a major strategic problem. There must have been a decision that the inflexibility of the missile is a less serious drawback than the difficulty and expense of providing a degree of invulnerability to aircraft through hardening, or bases and airborne alerts. If, as seems to be inherent in our planning, the premise is granted that this nation will be struck first, then the system which is most easily provided with a degree of invulnerability seems to be the preferable choice. This seems to be a logical policy for a nation which has sacrificed the option of striking first. On the other hand, such a procedure assumes a certain degree of risk, especially in a situation, such as atomic warfare, relative to which so little empirical data exists.

Testimony before Congressional committees indicates that a considerable difference of opinion exists within the Department of Defense with regard to the efficacy of high-level bomber attack. The Secretary of Defense

expressed particular reservations concerning the advantages which the high speed and high altitude of the B-70 might impart in relation to continually improving defensive capabilities. This is not a particularly new controversy. It has existed in some form since Billy Mitchell first sank a defenseless hulk off the Virginia Capes. The discussion continued through and after the major bombing campaigns of World War II. It was revitalized in the B-36 controversy and will probably continue as long as manned bombers exist. Such a controversy, however, does have its value. It at least indicates that the defense establishment has not fallen into the trap of total reliance upon a single strategy. Doubtly it frequently a more dangerous symptom than controversy.

The fact that the controversy exists leads to the logical assumption that at least one segment of the defense establishment, and the Secretary of Defense is apparently a member of that segment, believes that probable future developments in defensive weapons will provide a more adequate defense against attack by manned aircraft. This conclusion is subject to a great deal of qualification. It must be viewed not only by itself but also in relation to warfare as projected into the missile era. It is extremely doubtful that anyone believes that absolute defense against aircraft will be achieved. In the era of nuclear weapons the aircraft attacking its objective can avoid very a large than several hundred of World War II aircraft (and that only [illegible] reaching the target successfully incorrect. But in the 1030-plus and the avoidance of the attacking weapon in missiles attain the degree of perfection which is apparently expected of them, then an enemy would be rather foolish to accept the high losses which improved defenses can inflict when he can accomplish the same results with

missiles. Even at a higher cost (which need not necessarily be the case) missiles would be cheaper than aircraft. The corollary to this is why concentrate on a defense that the enemy will not choose to break. This discussion could be continued indefinitely, but this is not the proper vehicle for it. The foregoing was inserted to prevent the conclusion from falling into a rapid generalization such as many proponents will enjoy.

The discussion of defense against air attack brings to light another significant conclusion which may be deduced from the testimony of the Secretary of Defense. While the Secretary, and apparently many of his advisers, are perhaps optimistic about the progress of defense against high flying aircraft, no such optimism can be detected concerning the problem of low level attack. Consequently, it would appear that the problem of defense against low level aircraft has not been solved. One of the reasons for not proceeding with the B-70 and much to the Russians it would probably make its attacks at low level, and at such altitudes it would not avail itself of the Mach 3 speed capability and consequently, it offered no significant advantage over present day aircraft. This is doubtless an instance of equating some capability to our use. (Bearing the relevance of certain classified information which of course is not available for a study such as this), a task which is or should be inherent in the decision making process.

An unfortunate accessory to the foregoing conclusions is the apparent fact that there is little likelihood of an adequate missile defense being developed in the immediate future. The limited support accorded the Nike-Zeus program taken together with the emphasis placed upon establishing the invulnerability of the deterrent force that lead to no other assumption.

Finally, though it has received only the briefest mention in this study, there is an abundance of information available in the courses to indicate that the defense establishment is increasing the emphasis placed upon limited war forces. This study did not attempt to relate that effort to the decision under investigation, although the fact is of sufficient importance to warrant mention in any set of conclusions relative to national security policy.

Relative to the B-70

In relation to the amount of attention given to the nature and characteristics of the B-70 Valkyrie bomber, the number of conclusions relating to it are surprisingly small. This will be less surprising if it is remembered that the question of the B-70 was used as an example of the decision making process, and it was the process, not the aircraft, which was actually under investigation. Attention devoted to the B-70 was necessary in order to develop an appreciation of its relationship to and position in the process. It would however be indeed disrespectful to this truly wonderful machine if at least a few conclusions could not be drawn regarding it.

The first conclusion is one which must be subjected to a number of very stringent qualifications. The conclusions set forth in this chapter must be based upon observed and documented facts. As such they are only valid for current circumstances. Projection into the future on such a basis becomes a highly risky undertaking. With this broad qualification as background, we may proceed with the conclusion that it is very doubtful that the B-70 bomber will ever be ordered into production as a weapon system. This conclusion is based upon the testimony of the Secretary of Defense and an

evaluation of the immediately pertaining circumstances. We have, however, seen that the Congress has indicated its wishes in the matter, and those wishes are that development on the B-70 as a weapon system proceed forthwith. The Congress is not without methods of exerting pressure to see that its wishes are accorded respect. Whether Congress will see fit to exert such pressures is problematical. The circumstances might tend to indicate otherwise. Apart from the obvious fact that both the administration and the legislature are of the same party there is the traditional tendency of the Congress to treat a new administration with a certain amount of friendly regard, if for no other reason than to permit the nation's business to undergo the transition between administrations with the minimum interference. Whatever the outcome, the resolution of this contretemps should prove an interesting display of practical politics in action.

Aside from the pressures which Congress might apply, there is always the possibility that peripheral circumstances might change the relative weights of the factors in the original decision to such an extent that a reversal of that decision might be appropriate. Scientific advances in one field or another could constitute such a situational change. In another context, a variation in the amounts of money available within various sections of the budget might result in a situation in which development of the B-70 as a weapon system might actually be the most efficient management of the available money.

Consequently, a conclusion that the B-70 will not be ordered into full production must of necessity be a tenuous one. But in the light of presently recognizable circumstances, it seems a proper one.

The failure to proceed with full production, however, does not represent a total loss. The nearly $1 billion dollars invested in the B-70 program have not been wasted. The funds invested in research and development of systems, even if those systems eventually succumb to the vicissitudes of progress before they can manifest a return on the investment represent a necessary condition of life in the face of the cold war and a rapidly evolving technology. The failure of a project such as the B-70 to "pay off" can be begrudged no more than can the failure of a life insurance policy to do similarly during the lifetime of the insured. Just as failure to utilize the advantages of insurance might result in disaster, so might the failure to undertake a project such as the B-70. Insurance can be cancelled when it is no longer necessary. The cancellation of insurance represents a serious decision, but one that is often necessary in order to maintain a sound financial situation. The B-70 project is in essence very little different than the insurance analogy.

Additionally, technical and scientific knowledge acquired through the B-70 program represents a return on the investment. This is a characteristic of a great deal of military spending. If no other aspect of the program represents a significant advance (and that would be certainly doubtful) the techniques developed for the construction of airframe components designed to operate in high heat environments will eventually prove of great usefulness. If further investigation proves the desirability of developing supersonic aircraft for other than military purposes, the technology developed in the B-70 program will assuredly play a large part.

Relation to the Governmental Structure

The discussion of the role of Congress has tended to indicate that the control of Congress over the nature of the military establishment is in the final sense a negative one. Congress may withhold appropriations from the defense establishment and thus prevent the procurement of certain types of weapons, but at present there is no legal way in which they may force the administration to spend money which they have appropriated. It is conceivable that this might be a fruitful subject for a decision by the Supreme Court interpreting constitutional intent. At the present time there does not seem to be any strong feeling developing to carry the question to such lengths. As was previously mentioned, congress is not without the means to exert pressure on the administrative branch of the government. Such pressures are numerous and in some cases they might become particularly strong. So while Congress cannot legally force the administration to configure the armed forces to its own desires, they are not completely helpless in this regard. The nature of these pressures is so widespread, and in many cases so obvious that they need not be delineated here.

With regard to the best configuration of the armed forces, however, it would seem that Congress is to a very large extent highly dependent upon the information that the military provides them in regard to the most desirable composition of these forces. (This includes not only the military members of the Defense Department, but the civilian members as well.) Even granting the efficiency and ability of committee staffs, they can never have the total amount of information which the intelligence positions of the Armed Forces can provide, and consequently the Defense Department enjoys a favorable position in this regard.

In extension of the foregoing conclusion, the research for this study has indicated that Congress holds in high regard the advice of the military officers upon whom they are dependent. The actions of the Congress in appropriating more money for the B-70 than the administration requested indicates that they were strongly influenced by the testimony of Air Force advocates of the program.

This gives rise to the question of the extent of the traditional civilian control of the military in the United States. Although the question was not pursued as an aim of the study, no evidence was uncovered which would tend to indicate other than that civilian control of the military establishment continues to be a basic characteristic of the American governmental system. The military can exert an influence on governmental process but this in no way seems to extend beyond the inherent duty of the military to advise on matters which come naturally within their sphere. With regard to the advice of the military officers, the records of the various Congressional hearings amply demonstrate that responsible military officers are under no apparent restriction regarding their freedom to give the Congress their own particular views on military topics. The strong advocacy of the continuation of the B-70 program by the Secretary of the Air Force and senior Air Force officers, despite the official position of the Secretary of Defense adequately illustrates this conclusion.

Relative to the Decision Making Process

The investigation concludes with a few remarks on decision and the decision making process. The detailed account of the processes involved in arriving at a decision reveal at least two characteristics relative to decision. The first characteristic is that decision and its execution is

a form of mental process exercised by an individual in the accomplishment of his specific duties. In this instance these duties happened to be of an official nature. In a differing context these "duties" might be the simple function of day to day existence. As such, decision making is a part of the normal routine of living. Every person is in some degree a decision maker, although the magnitude of decisions may encompass a great variation in degree. A second characteristic of decision is that the process of decision making within a particular organizational entity is shaped by the structure of that organization. The two characteristics form an important division in any study of the decision making evolution. For the sake of simplicity the first activity, that of the individual human being may be termed the process of decision. The second, the organizational arrangement for the handling of decisions may be termed the decision making process. The classification is completely arbitrary and is established solely for the purpose of facilitating discussion of the subject in relation to the conclusions to be presented herein. If the classification has further merit its utilization may be extended. Restating our terms permits the formulation of two basic conclusions, which to a limited extent are also minor hypotheses for the remainder of the discussion. Firstly then, the process of decision is the intellectual activity in which an individual engages in attempting to attain a solution to a problem, to make a choice between alternatives, or to decide on the most advantageous course of action. Secondly, and in an arbitrary definition for the particular convenience of this study, the decision making process may be described as that arrangement of administrative organization established to facilitate the process of decision at various levels of authority and responsibility. The many comments

concerned relative to the longer lead times in the development of American weapons provides an example of the relationship of the decision making process to the process of decision. The decision making process governs the number of processes of decision which must be executed and the speed with which the execution of such processes can be accomplished throughout the various levels of the organization. With these two basic distinctions established it is now possible to continue with further efforts at developing pertinent conclusions.

The decision which has been reviewed and the testimony which was given regarding this decision indicated that the process of decision is the simple weighing of the import of various factors as they impinge upon a situation. While this conclusion may lack the esoteric overtones that the importance of the subject might seem to indicate are warranted, it is difficult to render it more complex. Nor is such action particularly necessary or desirable. The most accurate formulation of the process of decision is probably contained in the simple and effective military process known as developing an "estimate of the situation." Either the estimate of the situation or the process of decision, whichever term is preferred, is really no more than an attempt to achieve the planned application of common sense which may often be neither very simple nor very common. The difficulty in decision making is not in the choice between alternatives but rather the importance of insuring that the implications of the various alternatives are clearly perceived and that the relative weights assigned to the various factors entering into consideration are established with a high degree of precision. It is of course the volumes which complicate the process.

Within the framework of the foregoing discussion it may be postulated

that the process of decision is in the final analysis a highly imaginative and subjective practice. As long as final decisions are rendered by human beings, those decisions will be colored by the beliefs and feelings of the individual. Regardless of the degree of objectivity with which relevant factors are presented and analyzed, the ultimate objectivity of the decision can probably be no greater than the objectivity of which the decision maker is capable.

Another factor which becomes apparent from a review of the decision in the instance under investigation is that a decision not to decide, or to postpone final and irrevocable decision is a positive action. It should not be automatically assumed that such an action is indicative of indecision or confusion. It is completely possible that circumstances dictate that this is the most practical and desirable course of action. Subsequent events may prove that a decision to avoid positive action was a good one, but such an analysis can usually be developed only after the fact, with the benefit of hindsight. But the decision maker must execute his judgment on the basis of currently available information. In such a hence it is quite probable that a course to avoid commitment might be the most logical. It is only necessary to point out that such an action generally will allow the decision maker to retain the option of flexibility of action in the future to illustrate the importance of such a decision.

From the material presented in the body of the thesis and in the discussion immediately foregoing it is possible to detect another serious problem, and that is that the decision making process is stymied by the administrative or other organizational arrangement in which the decisions are made. Not only will the decision be stymied by the administrative structure

but the future impact or intent of the decision may be highly modified by the nature of the structure. The example of lead time is an indication of the former condition, while the actions of Congress in providing defense appropriations illustrate the latter condition.

Finally, the obligation to render decisions is an inherent attribute and measure of responsibility. The ability to enforce decisions is likewise an attribute and measure of authority.

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